Control Nesting Manual

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Until Control Nesting version 5.0, all profiling done in eCabinet Systems with the Part Editor had to be machined using the Profile Modeller. This meant that all parts needed to be done on a one by one basis. Now with Control Nesting v5.0 and up, profiled parts can be nested and cut out using the same technology available with Profile Modeller. Since it uses Profile Modeller functionality you must have Profile Modeller installed on the Controller. If the Controller do not have Profile Modeller version 2.0 or higher installed Control Nesting will not support Profiling. If you start Control Nesting and see (With Profile Modeler) stated at the top of the dialog. You have the correct versions installed. This must be present to function.....79
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Control Nesting

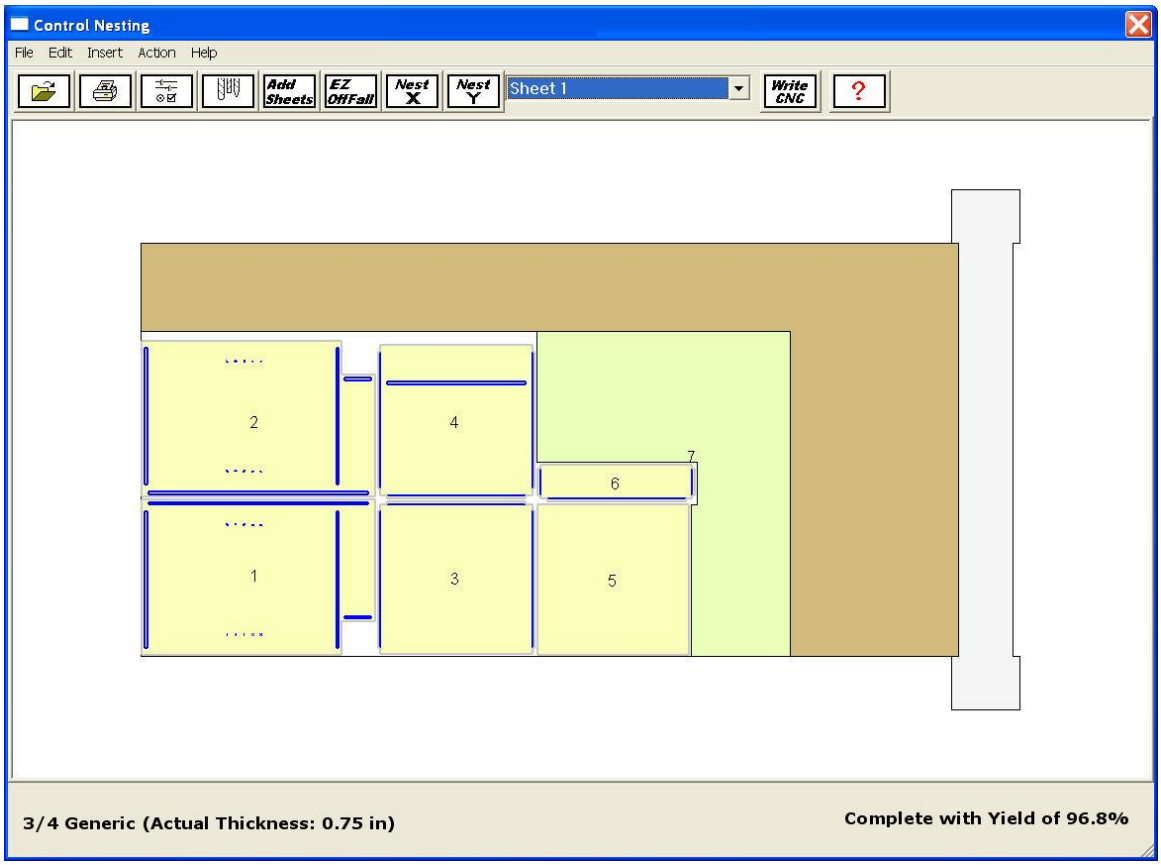
Control Nesting

User Manual

Last Updated: L.E. 10/29/2015 Version 5.x

Introduction

Control Nesting is a nesting package integrated into the Thermwood Software.
This package allows the user to nest various parts into sheet stock, thus creating a user-friendly program. Some benefits of this particular package include better yield, mixing of different parts, label printing for the parts as well as off-fall, ability to re-use off-fall, etc. It will also display a graphical view of the nest to insure it will suit the user's needs along with a yield percentage per sheet stock.



Specifications

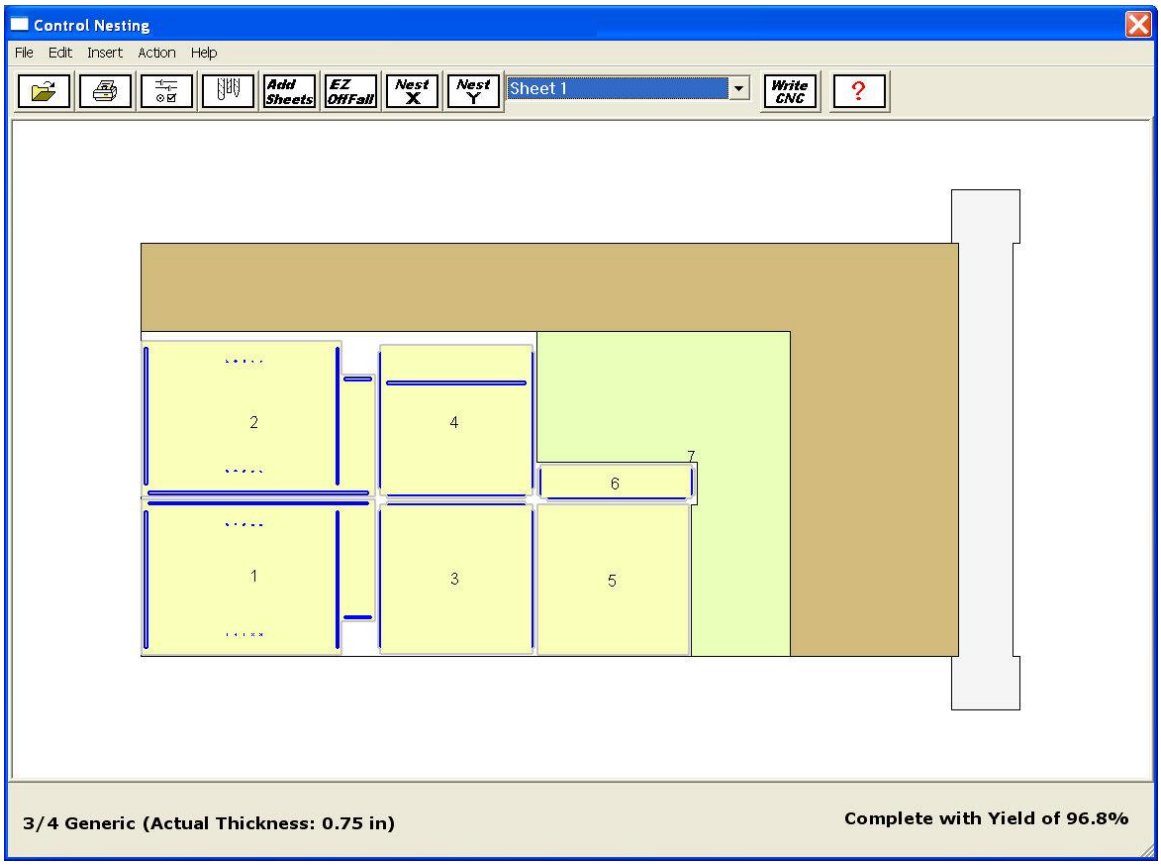
Control Nesting is compatible with Thermwood Software versions 5.0 and later.
It can be used in conjunction with eCabinet systems software to quickly nest and generate CNC programs from the provided TWD files. Control Nesting can also be used to nest DXF part files that are generated from almost any CAD/CAM system, Cut Planner Files which are generated from software called Pattern Systems, and Manual Panel entry.

Definition: Off-fall = Usable scrap leftover from an operation.
Operation

The user may activate Control Nesting from the Thermwood Software by pressing F11 (THM Options) then F2 (Rolling Nest) on the keyboard or by selecting F10 (Main Menu), F5 (File), then F1 (Load File) and loading the particular TWD file.

On versions of THM that have the Windows menu at the top then the options for starting Control Nesting are by clicking the thumbnail or loading the twd file.

When started a dialog box will appear resembling the following picture:



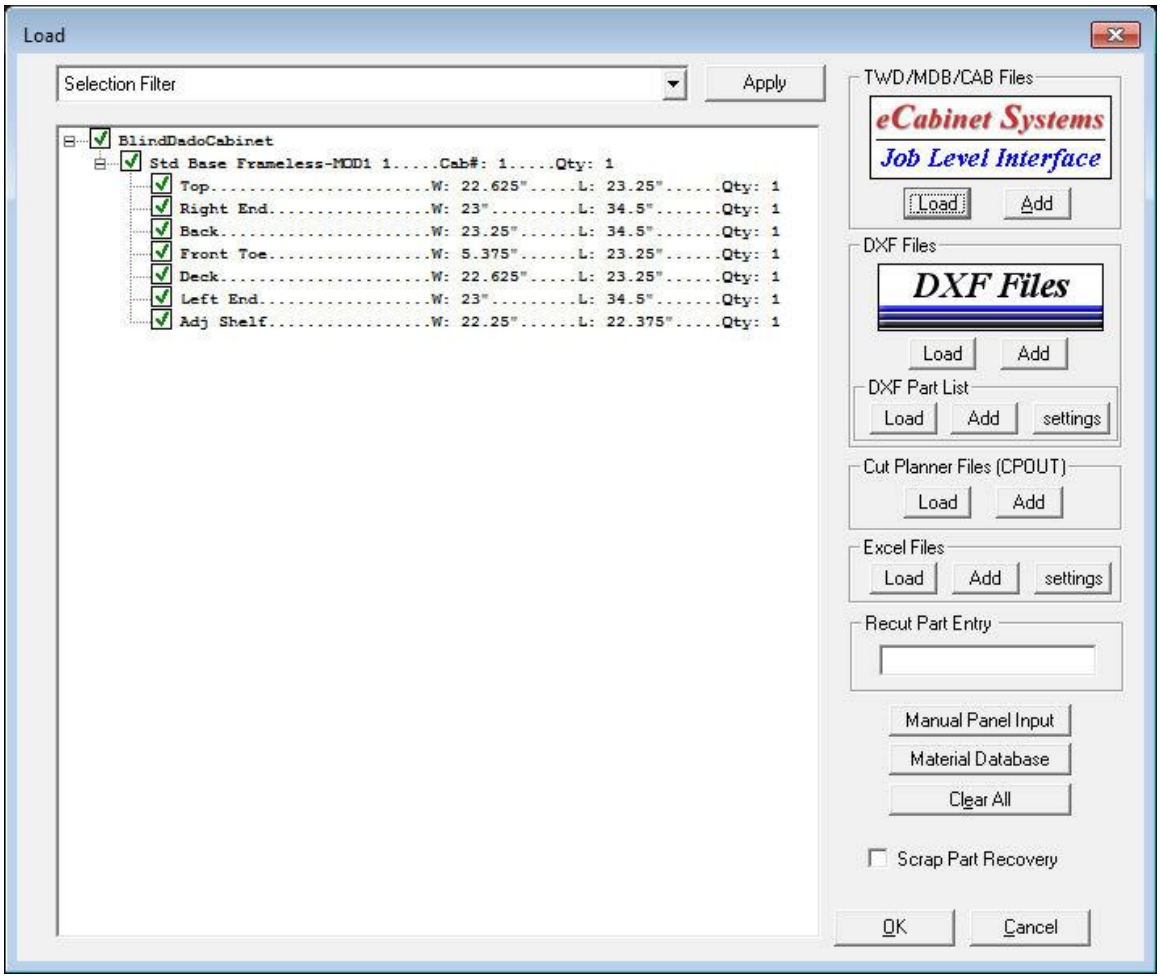
Export

The Export option will create a file containing all the current setting in Control Nesting. This helps Thermwood debug any cases that are causing problems. To create an export click on the File menu and select the Export option. Then send this file to Thermwood with a description of your problem.

Loading

Loading Files

Clicking on the “Load” button will bring up the Load dialog which is the interface used to load all compatible files into the Control Nesting Software. The large, white window on the left contains the current parts ready to be nested. The column to the right contains load and add buttons for each compatible file.

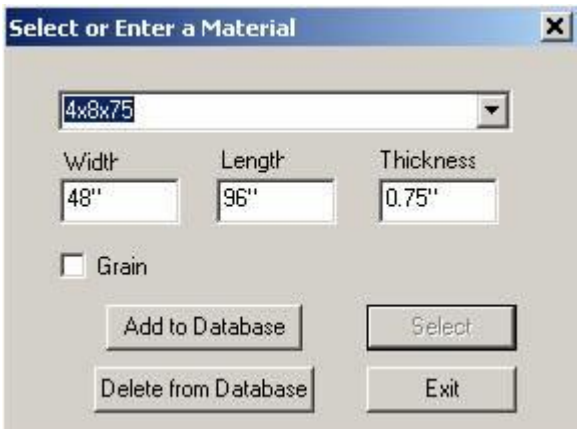


eCabinet Systems Files (*.twd)

To load a new file, press Load which is located under the heading "TWD Files" (eCabinets icon listed below). Once the window's browser appears, the operator will need to select the correct file or files that he/she wants to load (To select multiple files, hold down Ctrl. Key when selecting). Once the selection has been made a list of parts will then appear in the window on the left. If the user looks closely, they will notice check marks aside of the cabinet(s) name and individual parts. If the check marks are removed, that part will not be included in the nest. Then operator also has the option to change the quantity of the parts that are going to be cut. To do this, they must select the specific line containing the parts that they want to change the quantity of. Then, by pressing the "Enter" key, this will enable them to type in a new quantity. Once a file has been loaded, more files can be added by pressing the "*Add"* button, located under the "TWD Files" heading. To clear all parts listed in the Load Screen; press the "Clear All**"** button. Otherwise, when loading a TWD or DXF file the load screen will automatically be cleared.

DXF Files

Too Load or Add DXF files, the user will need to use the Radio buttons under the heading "DXF Files" (notice DXF Files icon) and select the appropriate button. Once the DXF file or files have been selected, the operator will be prompted to enter the material information. At this point they can either choose from the pull down menu or add a material.

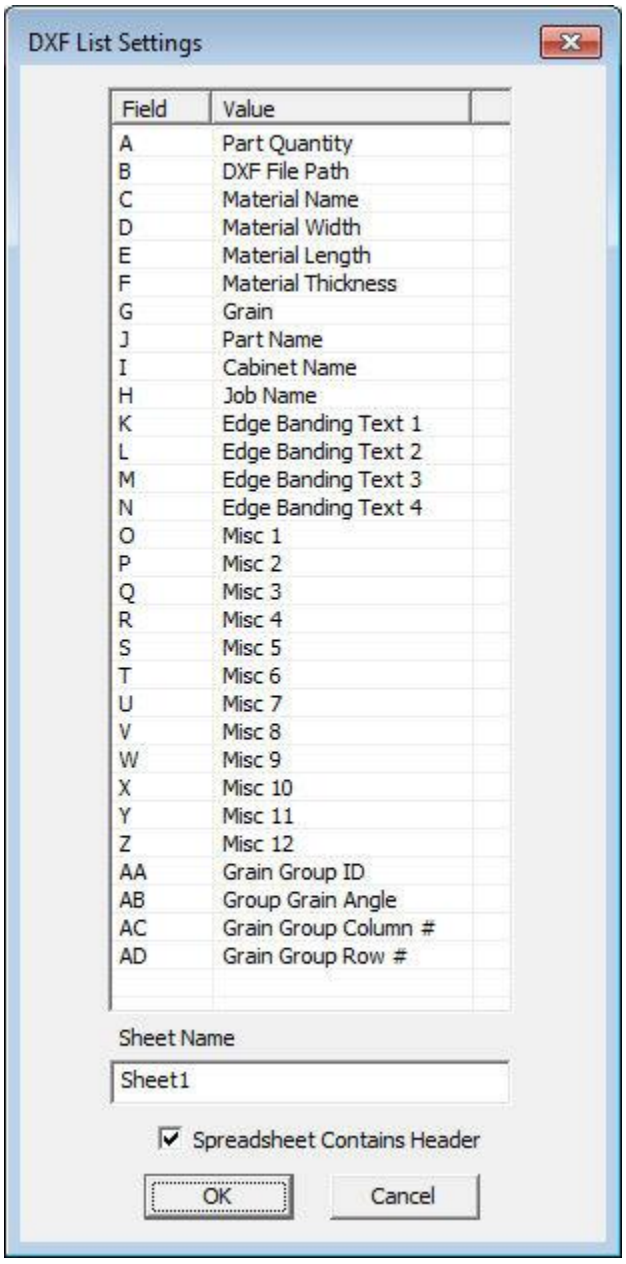


Upon completing the material input, the parts will be listed in the white load screen to the left. Control Nesting will allow the user to load a combination of DXF and TWD files for nesting. After the files have been loaded the user will select OK to get back to the nesting screen. Please refer to the "DXF Translator" section of this manual for specifications on creating DXF files properly in order to successfully nest them.

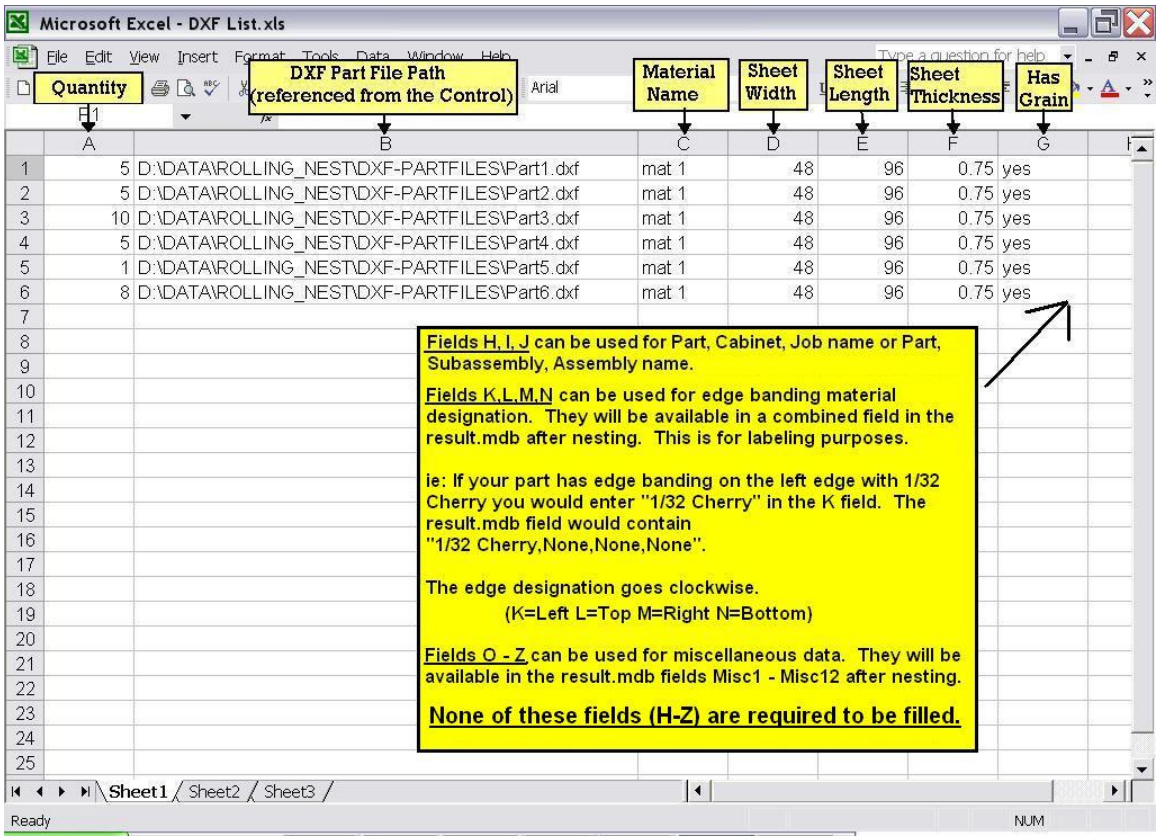
DXF Part List

Another option to load DXF files which is listed under the *"DXF Files"* heading is "Load DXF Part List". This enables the operator to select an excel file that contains a list of DXF files that reside in a particular location on the controller.

The "settings" button will bring up the DXF List Settings dialog. The user can select the Field or Value they which to alter for designating the location of information in the Excel spreadsheet. The entries must all be designated only once. Duplicates are not allowed. The *"Sheet Name"* can be altered if the default value of "*Sheet1"* is not used in the spreadsheet. The option *"Spreadsheet Contains Header"* will tell Control Nesting to skip the first record when enabled.

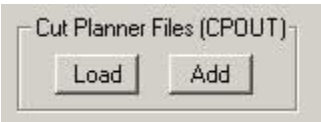


Below is a description of the default Field to Value relationships.


Microsoft Excel - DXF List.xls
Quantity
DXF Part File Path (referenced from the Control)
Material Name
Sheet Width
Sheet Length
Sheet Thickness
Has Grain
Fields H, I, J can be used for Part, Cabinet, Job name or Part, Subassembly, Assembly name.
Fields K,L,M,N can be used for edge banding material designation. They will be available in a combined field in the result.mdb after nesting. This is for labeling purposes.
ie: If your part has edge banding on the left edge with 1/32 Cherry you would enter "1/32 Cherry" in the K field. The result.mdb field would contain "1/32 Cherry,None,None,None".
The edge designation goes clockwise.
(K=Left L=Top M=Right N=Bottom)
Fields O - Z can be used for miscellaneous data. They will be available in the result.mdb fields Misc1 - Misc12 after nesting.
None of these fields (H-Z) are required to be filled.
Sheet1
Sheet2
Sheet3
Ready
NUM

Cut Planner Files (CPOUT)

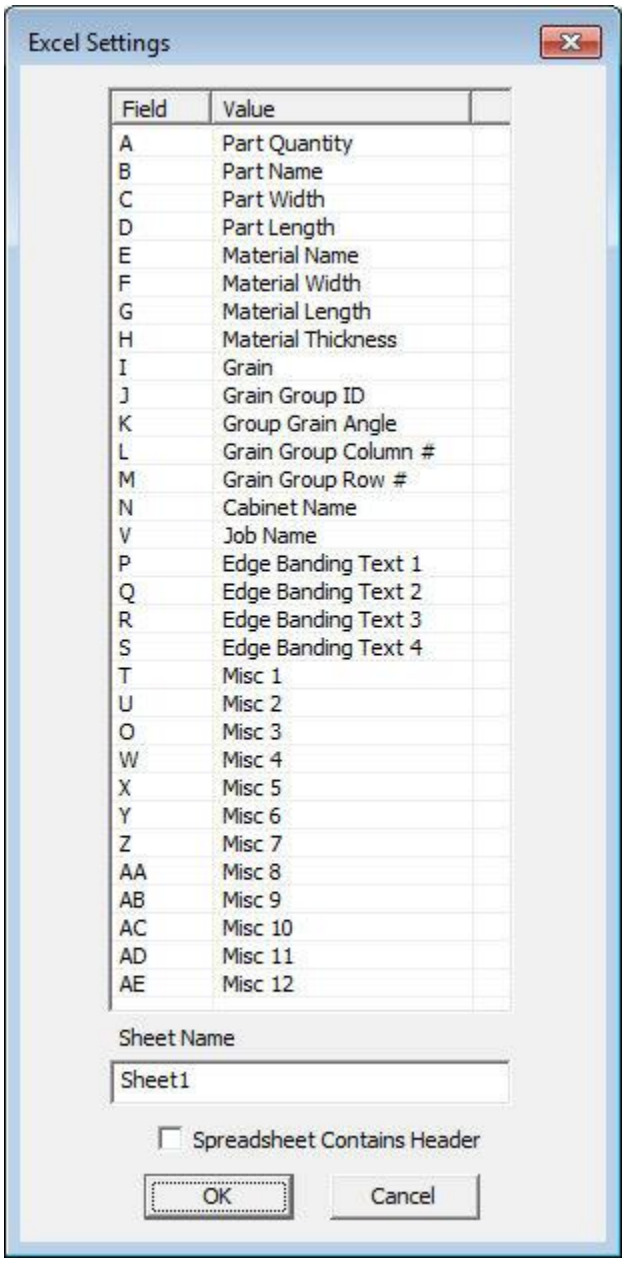
Control Nesting also has the option to load files that are from software called Pattern Systems. *"*Cut Planner files (CPOUT)*"* allows the user to Load or Add files that originate from Pattern Systems.



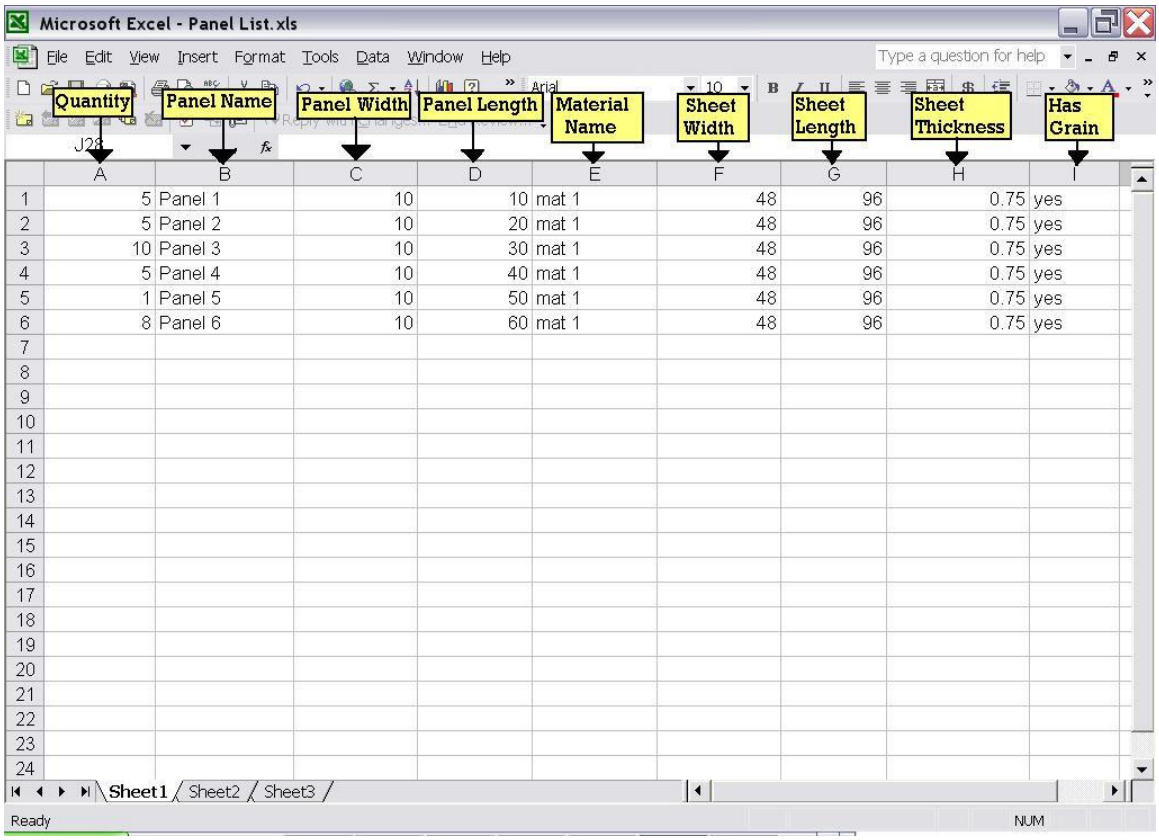
Excel Files

*"*Excel Files*"* gives the operator the option to Load or Add excel files containing a list of panels that they would like to cut. This is only for rectangular panel cutting.

The *"settings"* button will bring up the Excel Settings dialog. The user can select the Field or Value they which to alter for designating the location of information in the Excel spreadsheet. The entries must all be designated only once. Duplicates are not allowed. The *"Sheet Name"* can be altered if the default value of *"Sheet1"* is not used in the spreadsheet. The option *"Spreadsheet Contains Header"* will tell Control Nesting to skip the first record when enabled.



Below is is a description of the default Field to Value relationships.



	A	B	C	D	E	F	G	H	I
1	5	Panel 1	10	10	mat 1	48	96	0.75	yes
2	5	Panel 2	10	20	mat 1	48	96	0.75	yes
3	10	Panel 3	10	30	mat 1	48	96	0.75	yes
4	5	Panel 4	10	40	mat 1	48	96	0.75	yes
5	1	Panel 5	10	50	mat 1	48	96	0.75	yes
6	8	Panel 6	10	60	mat 1	48	96	0.75	yes

Manual Panel Input

Manual Panel Input allows the operator to input custom panel sizes right at the controller and nest them.

Material Database

The Material Database button lets the operator access the material database so that he/she can input or remove materials they are using for DXF file nesting.

Clear All

To clear all parts listed in the Load Screen; press the “Clear All” button. Otherwise, when loading a TWD or DXF file the load screen will automatically be cleared.

Scrap Part Recovery

There may be times that a particular part moves during machining, resulting in a defective part. This means a single part will have to be re-machined. To do this, the

operator needs to go into the Load screen and make sure that only the parts that need cut again are selected. Then, they will need to place a check mark aside of the Scrap Part Recovery option which will cause the machine to run only one part per sheet. Each part will be cut at the flip operation fence and follow the X & Y Shift settings.

The option for no outline cuts in Settings will be obeyed. If it is selected the part to be machined will need to be cut to size and can be placed in the fence location for the operations to be performed.

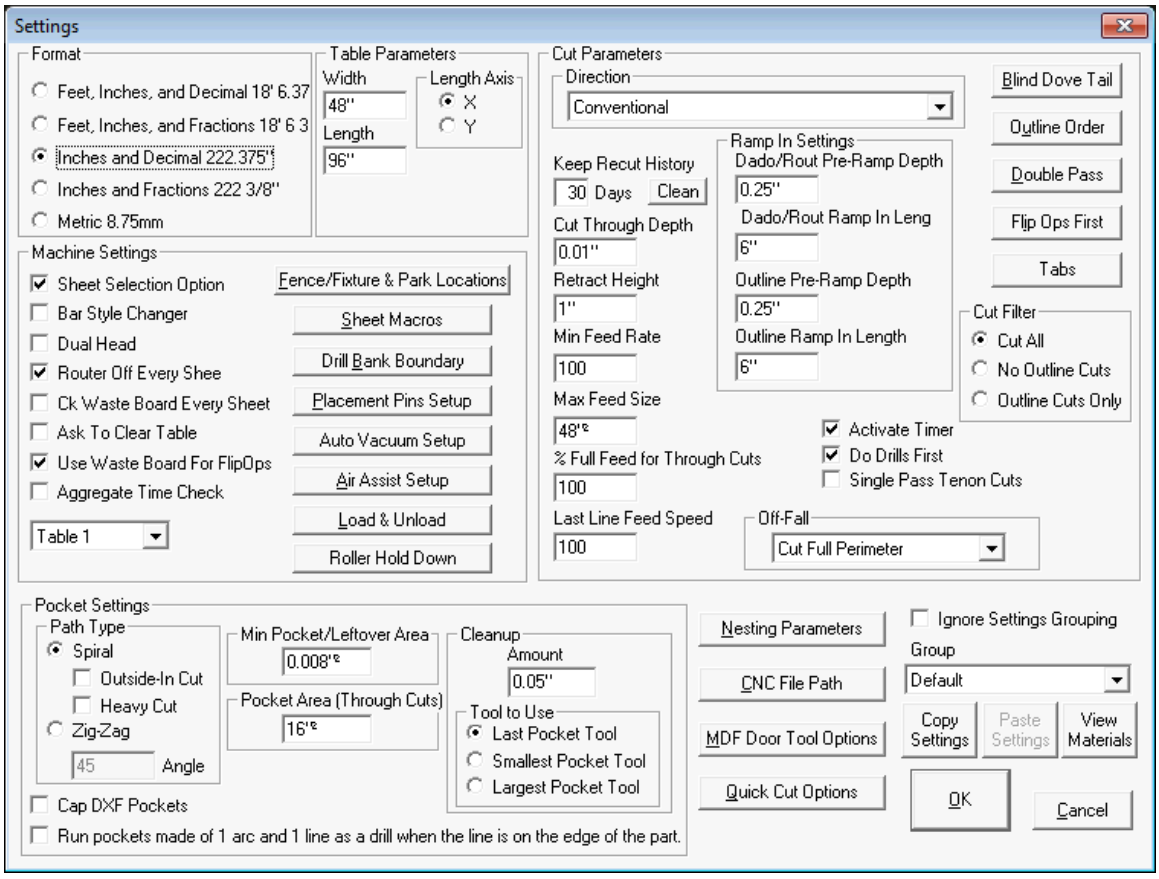
If the no outline cuts selection is not selected then the machine will run the outline pass. Material will need to be a size greater than the part by the diameter in width and length when the option Nest to Edge of Sheet is NOT selected. If Nest to Edge of Sheet is selected then the material does NOT need to be oversized.

The Part Rotation Step Angle option in Settings is also obeyed. For example, if the setting is 90 degrees then the part(s) will be rotated 90 degrees.

Settings

Settings

The Settings option must be addressed prior to running the Control Nesting software, in order for the nesting feature to operate correctly. When selecting the Settings button at the main Control Nesting screen, the following dialogue box will appear:



Dimension Format

The section named “Format” is the dimensional mode in which the CNC code will be written when the operator chooses too write the CNC code. The Format can be set to any of the dimensional modes when nesting TWD files. However, when nesting DXF files the format must be set to the same dimension in which the drawing file was created.

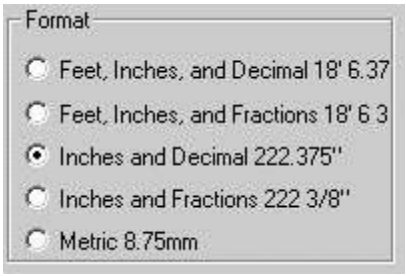
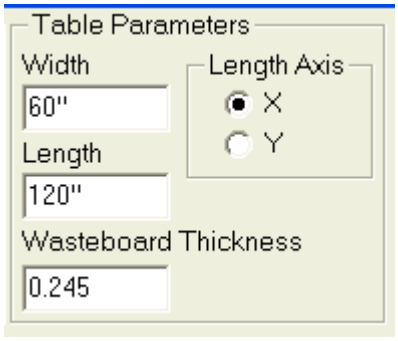

Format
Feet, Inches, and Decimal 18' 6.37
Feet, Inches, and Fractions 18' 6 3
Inches and Decimal 222.375"
Inches and Fractions 222 3/8"
Metric 8.75mm

Table Parameters

The section named **"**Table Parameters*"* defines the size of the machine table, ability to swap X with Y, and the thickness of wasteboard being used. If a wasteboard is not being used, then this value should be set to zero.

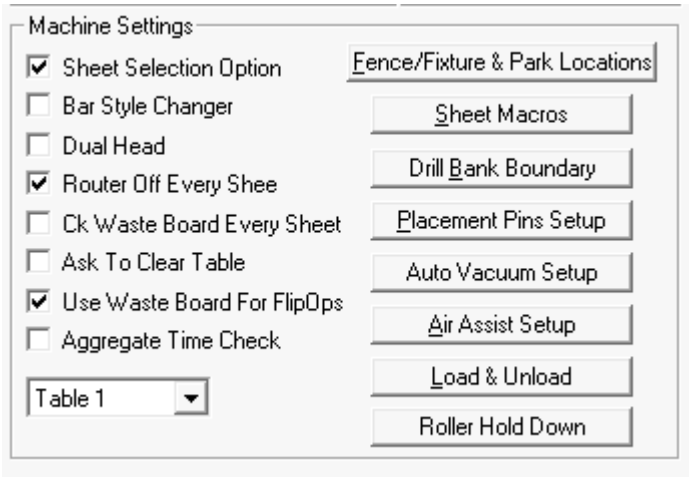
The "Length Axis" value setting is used to set which axis on the machine is longer. Most cabinet machines have X as the long axis. Some Model 67 configurations have the Y axis as the longer axis so this value should be set to Y for those configurations.



Machine Settings

Machine Settings

The section named *"Machine Settings"* is used to activate the different options that the CNC machine being operated may have.



Sheet Selection

"Sheet Selection" enables the operator to select a specific sheet that they want to start machining on, when starting a particular CNC program.

Roller Hold Down

The "Roller Hold Down" option is used for machines containing the roller hold down option.

Minimize Indexing Along X

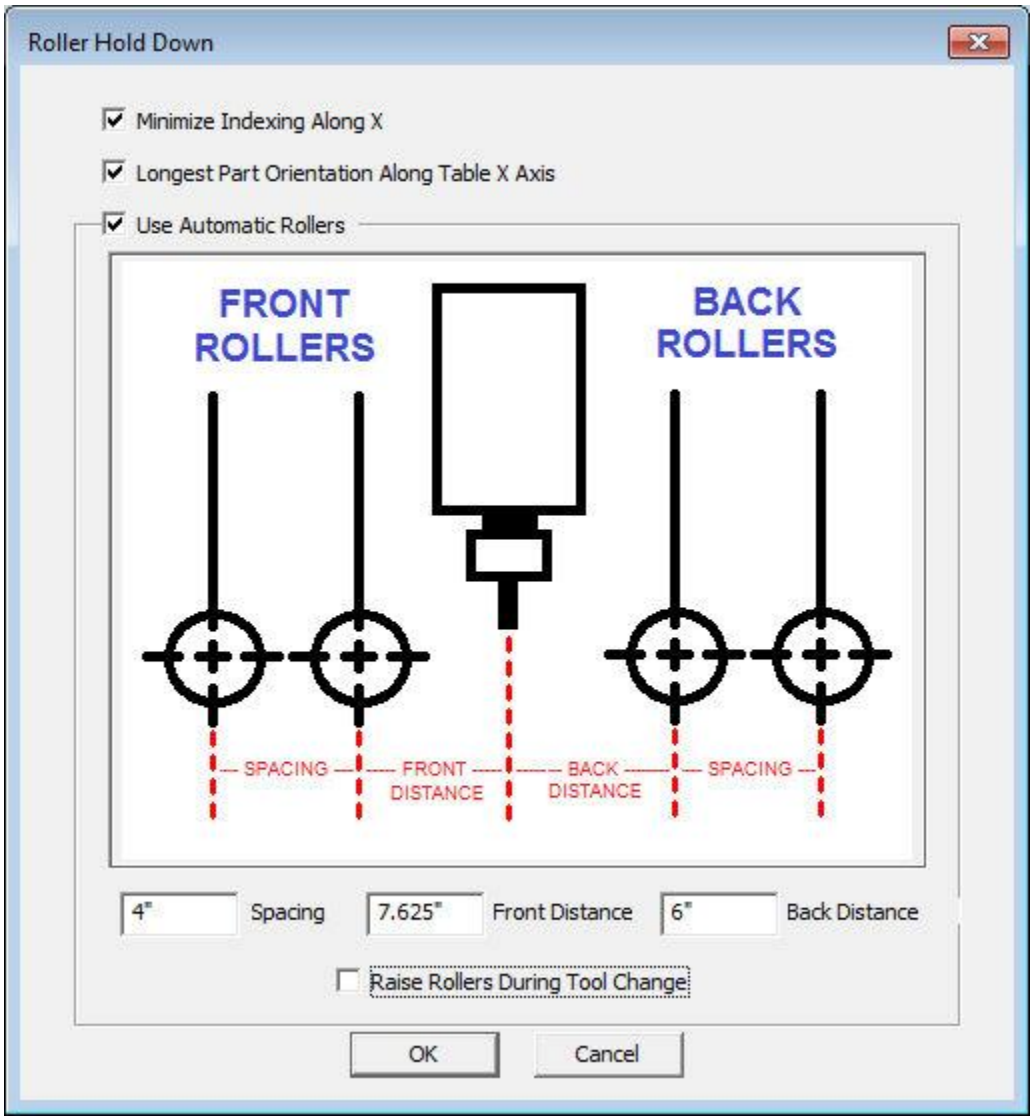
Control Nesting will perform perimeter cuts starting with the parts closest to the home position and move along X to the final part. This minimizes indexing from part to part.

Longest Part Orientation Along Table X Axis:

Control Nesting will nest parts so that they are positioned long ways crossing the rollers. This will provide better hold down of the parts by the rollers.

Use Automatic Rollers

Some Thermwood machines have the option for rollers to automatically raise and lower based on where the sheet starts and ends along the X axis. This option can be enabled here. Control Nesting will make the appropriate calls to enable/disable the auto roller option with the appropriate sheet size. The default values are normally within acceptable tolerances. They can altered if desired. If the machine needs to leave the sheet area for a tool change then the option "Raise Rollers During Tool Change" should be checked on. If the machine has an at-the-head tool changer then this option is not necessary.



Bar Style Changer

The "Bar Style Changer" option is used in conjunction with the "Aggregate Time Check" option when calculating weather or not it will be more efficient to drill holes with the router or use the 9-spindle drill bank. If your machine doesn't have the 9-spindle drill bank, neither the "Bar Style Changer" or the "Aggregate Time Check" options should be checked. If these two options are checked, the software will consider the amount of holes to be drilled and compare the time it could machine the holes with the 9-spindle drill bank versus executing a tool change and picking up a 5mm tool from the Bar Style changer to machine the holes, using the faster of the two options.

Dual Head

When selected, the “Dual Head” option initiates Control Nesting to write the code needed to tie the Z and W heads on a dual headed machine.

Router Off Every Sheet

“Router Off Every Sheet” insures that the router will be shut off after completing cut operations on each sheet of material.

Ck Waste Board Every Sheet

“Ck Waste Board Every Sheet” prompts the operator to check wasteboard thickness every time a new sheet is started.

Aggregate Time Ck

If “Aggregate Time Ck” is selected, Control Nesting will decide whether to use single drill or a 3 spindle, aggregate drill for drilling operations.

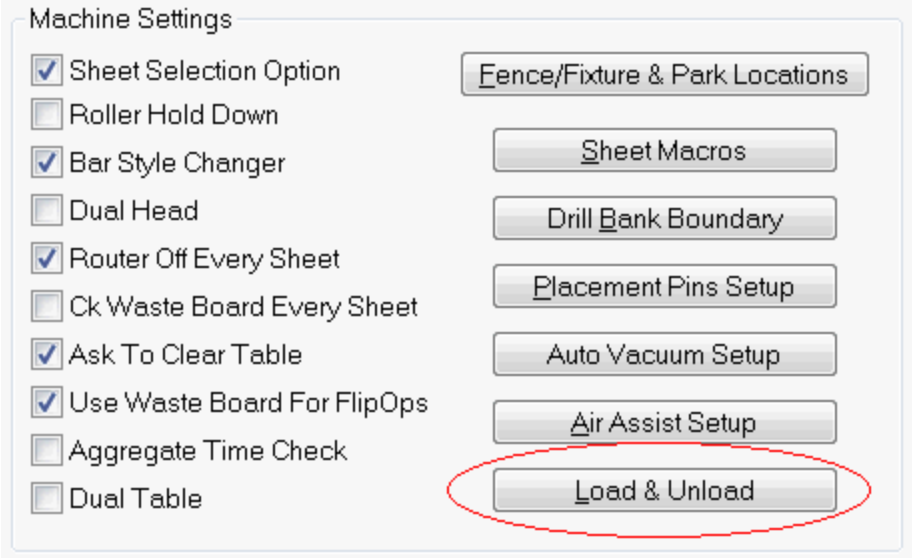
Table Options

The table options drop down box allows for use of 1 or 2 tables on dual table machines. The job can be ran on either Table 1, Table 2, or Dual Table. When Dual Table is selected the job will alternate each sheet where the first sheet is on Table 1.

Single table machines should always set this to Table 1.

Load & Unload

Control Nesting will write logic to operate the Auto Load and/or Unload equipment for the specified number of sheets. Select the button "Load & Unload" to open a dialog to specify whether or not to use these features.

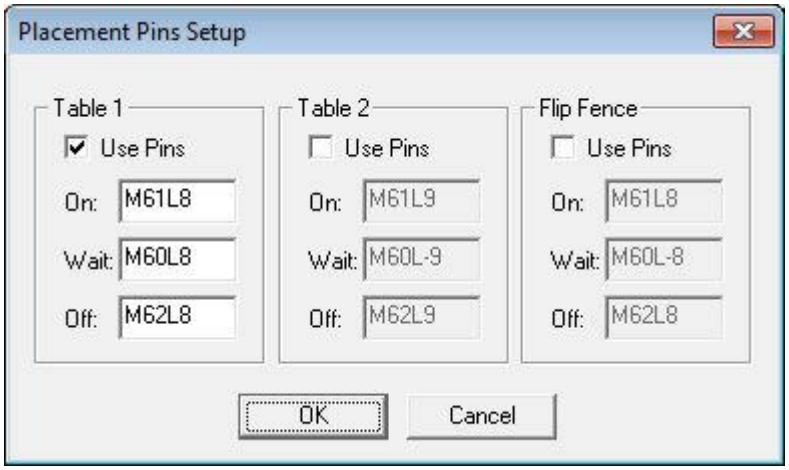


To implement the Load feature, insert the quantity of sheet to be loaded for each sheet nested. In most cases this will be 1, but some applications require cutting more than 1 sheet of material per nested sheet. If this value is 0 then the Load feature is not used.

To implement the Unload feature, check the box marked "Use Unload". This will activate the rake to unload the material after each nested sheet is complete.

Placement Pins Setup

"Placement Pins Setup" allows the operator to choose settings (which pins to use and I/O's that operate) for use of automatic popup pins. The operator has the ability with the dialog below to control which output is used to turn the pins on/off as well as which input must be met forcing the pins to "wait". The pins can be used for Sheet Operations, Dual Table applications and Flip Operations if required by checking the appropriate boxes.



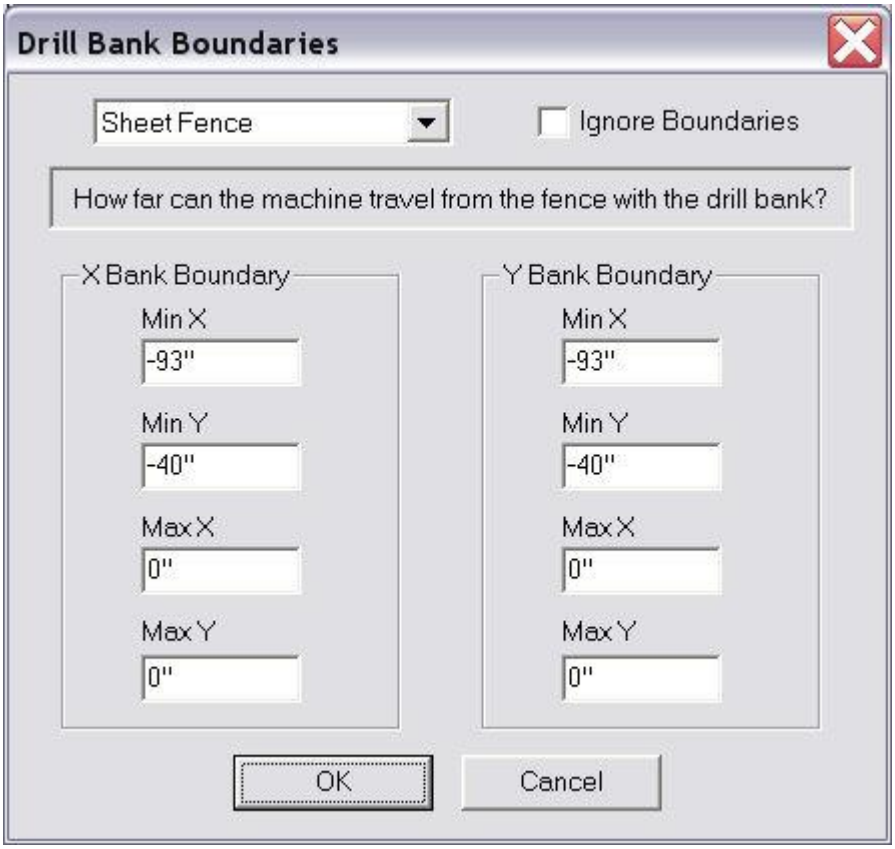
Air Assist Setup

The "Air Assist Setup" button contains settings that will have Control Nesting write the needed code to operate an automatic air assistance setup. The dialog below will allow the operator to choose to use Air Assist for either loading or unloading or both and which output number controls this function. Table 2 settings are only applicable on dual table machines.

Drill Bank Boundary

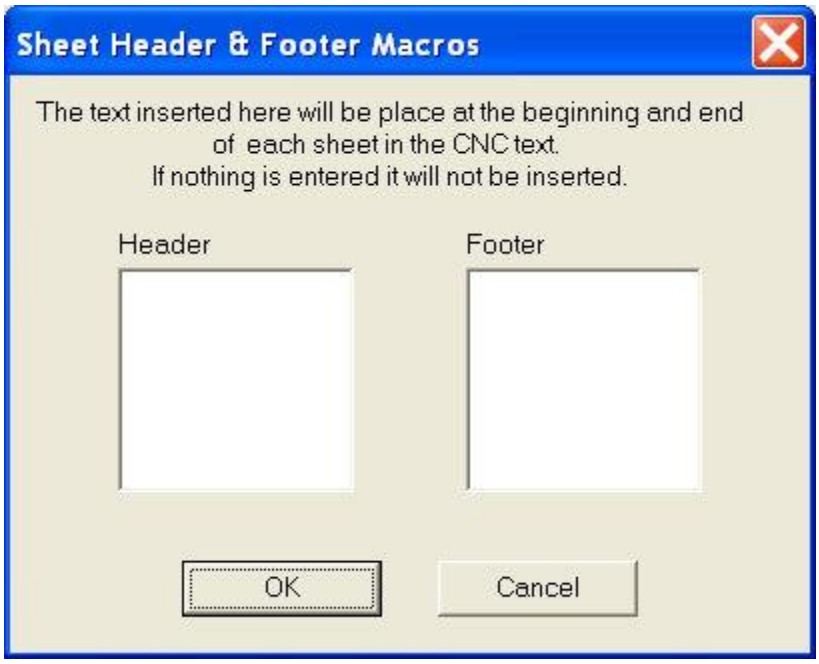
The "Drill Bank Boundary" button allows the user to define perimeters used to describe the areas of the table in which the drill bank can physically reach in reference to the fixture offset location (G901, M901, etc…). The following dialog will appear when clicking on the Drill Bank Boundary button. If a drill bank does not exist then the Ignore Boundaries option can be check. This allows Control Nesting to avoid doing unnecessary checking for boundaries. The drop down menu will allow you to set the boundaries for the Sheet Fence(see below), the Flip Op Fence or the Dual Table fence if applicable. These values are how far the machine can travel from the fence location. In this example the G901 Location is set up as the OPPOSITE corner of the sheet from the home location of the machine which means the Xshift and Yshift are checked in the Settings dialog. If

your fence location is the corner of the sheet CLOSEST to home then these values would be positive instead of negative.



Sheet Macros

Macros can be inserted before and after each sheet run. This allows for any unique load/unload operations to be inserted at the appropriate points in the CNC program. The feature is merely inserting whatever text, which is put in the edit boxes on the dialog displayed below, into the CNC program.. Multiple lines are possible for both Header and Footer.


Sheet Header & Footer Macros
The text inserted here will be place at the beginning and end of each sheet in the CNC text.
If nothing is entered it will not be inserted.
Header
Footer
OK
Cancel

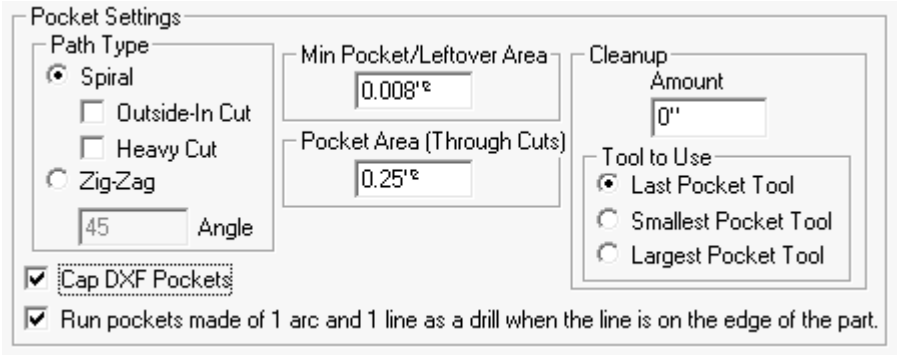
Pocket Settings

Pocket Settings

The "*Pocket Settings*" enable the operator to setup parameters for cutting pockets. The operator has the option to choose a "*Spiral*" or "*Zigzag*" cutting method when cutting pockets. The settings will be applied to all pockets in the nest.

Heavy Cut

The Heavy Cut option for spiral pocketing enables more precise pocketing to eliminate leftover from sharp corners and inner most loops missed due to large step over. Many times the Heavy Cut option can save time by allowing a large step over and adding a few additional motions to clean up the left over. This option can also increase time to complete the pocket. It is useful for complex pocket boundaries as well as large step over values, however, in most cases a pocket can be cleanly performed without Heavy Cut by choosing a smaller or more appropriate step over.



Pocket Clean Up

The “Clean Up Amount” is the amount of material that is left around the outer perimeter of the pocket, for a finish pass. The tool that will be used for this pass can be the last tool to run the pocket, the smallest tool that is set for a pocket operation in tooling, or the largest tool that is set for a pocket operation in tooling. This setting is available in the area marked *"Tool to Use"* in the Cleanup area of Pocket Settings.

Pocket Area (Through Cuts)

“Pocket Area (Through Cuts)” enables the user to control the tool deciding whether to leave a plug or too completely remove all material in the center of a pocket boundary. If the through pocket has an area less than the area specified, the tool will cut away all material within the pocket’s boundary. All through pockets, with an area larger than the specified amount, will be cut leaving a plug.

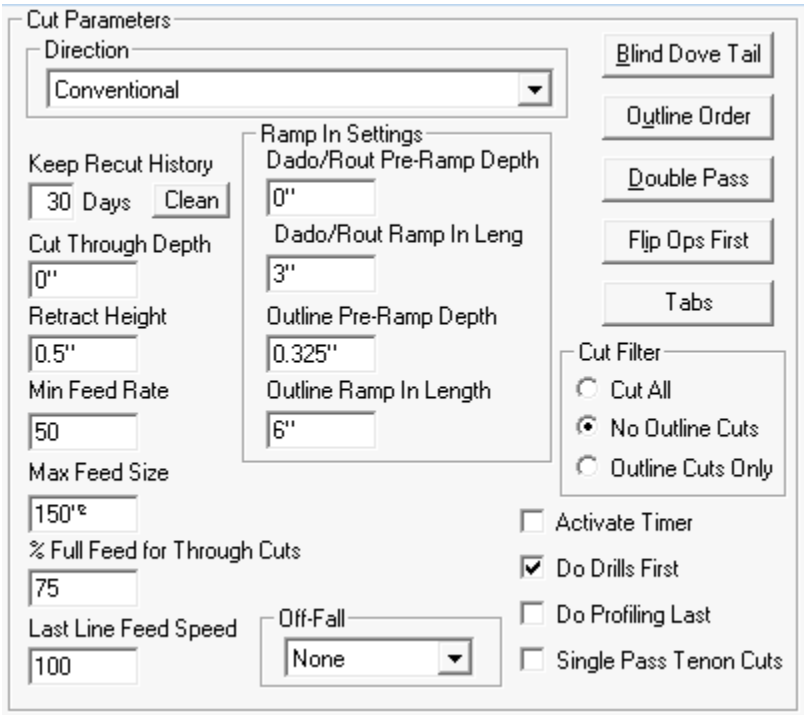
Run Pockets made of 1 arc and 1 line as a drill when the line is on the edge of the part

“Run Pockets made of 1 arc and 1 line as a drill when the line is on the edge of the part*,”* is used to cut KD fastener pockets as a drill operation, rather than using the pocketing method.

Cut Parameters

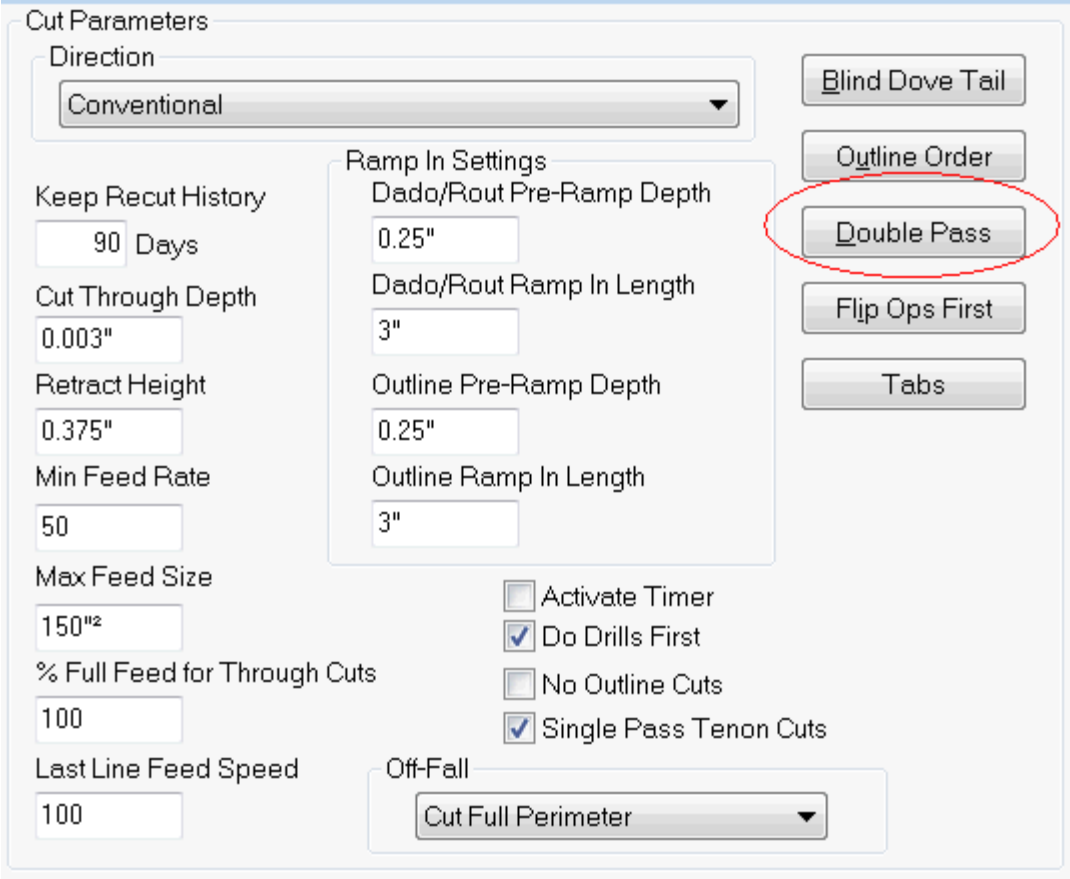
Cut Parameters

The *“*Cut Parameters*”* section allows the operator to control the cutting methods used when machining parts.



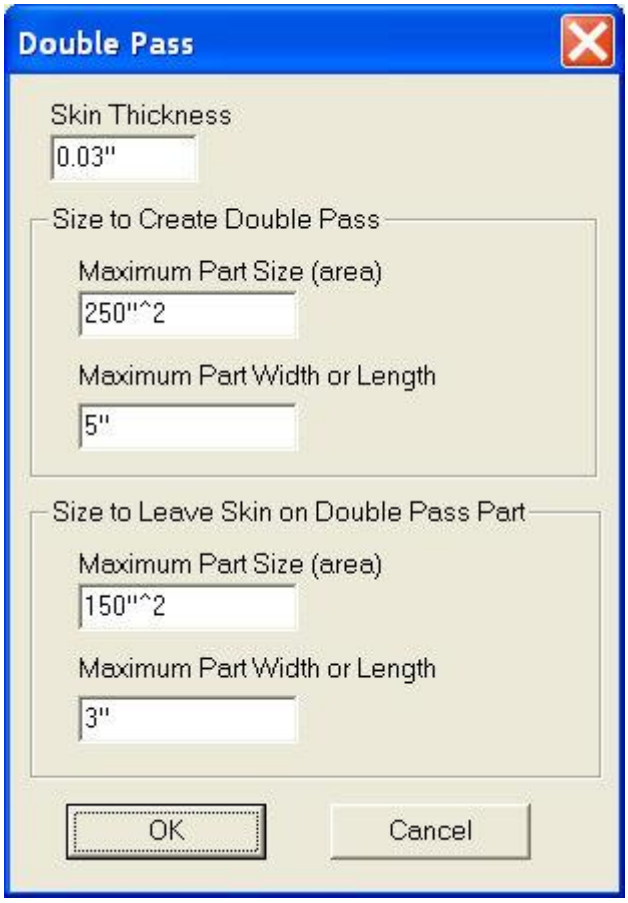
Double Pass

Control Nesting will perform a double pass on the outline operation of small parts. The size of this small part can be set in the Double Pass dialog. This dialog is accessed by clicking the Double Pass button.



The Double Pass dialog allows the operator to set a maximum square inch or millimeter setting as well as a maximum width/length value for skinny parts. Any part that falls below either setting will get a Double Pass operation on the outline. The outline tool will cut down to the Skin Thickness on the first pass.

If you wish to have parts not get the skin remove the "Size to Leave Skin on Double Pass Part" is provided. Any part that falls below either the Size or Width/Length setting will have the skin left on.



Ramp In Length (Dado/Rout & Outline)

Control Nesting ramps into a part rather than plunging directly into it. The benefits of this include, no burning of the material, longer cutter life, and longer spindle life. The length of this ramp is set within the "Ramp In Length". If we set this value to 6 inches, then it will take 6" to ramp to the proper depth of cut.

The purpose for having a separate setting for Dado/Rout operations is for cases like barb dado where a minimum ramp in amount is desired to avoid disrupting the barbs in the dado.

Cut Through Depth

The "Cut Through Depth" simply cuts through the part by the specified amount.

Retract Height

"Retract Height" is the distance the machine retracts above the part before indexing to the next part.

Outline Order

The "Outline Order" button gives the operator the option to choose what order he or she would like the parts too cut.

Pre-Ramp Depths (Dado/Rout & Outline)

"Dado/Rout Pre-Ramp Depth" and "Outline Pre-Ramp Depth" allow the machine to plunge into the material by the specified amount, before continuing with the ramp in. This is useful when machining laminated sheets with an up spiral or compression cutter. It helps prevent chipping of the laminate.

A rout is a tool path resulting from either a pocket or centerline operation.

% Full Feed for Through Cuts

The "% Full Feed for Through Cuts" field adjusts the feed rate set for the Outline tool. Example: If the outline tool is set to run at 500 IPM, and the "*% Full Feed for Through Cuts*" field is set to 50%, Control Nesting will run the outline tool at 250 IPM.

Last Line Feed Speed

The "Last Line Feed Speed" is used to control the rate of speed at which the machine performs the cleanup cut for the "Ramp In Length" of the part. This is used to prevent part movement when cutting the part free from the sheet.

Max Feed Size

The value entered in the "Max Feed Size" field is set to square inches. If a part has an area less than the "Max Feed Size", then Control Nesting will adjust the feed rate for this part only. This will also help prevent part movement for the small parts that qualify.

Min Feed Rate

"Min Feed Rate" specifies the slowest feed rate at which the machine will cut.

Activate Timer

Turning the “Activate Timer” on allows the user to keep track of how long it took to machine a particular job. Flip operations will not use the timer. Once all sheets have been machined, a dialog box will appear stating showing the time it took.

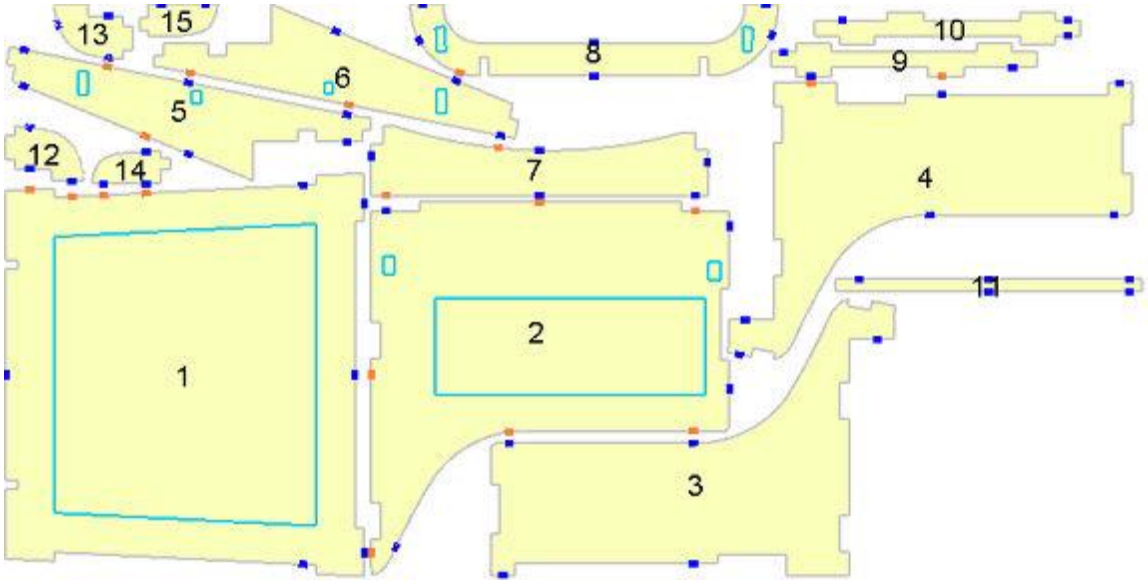
Do Drills First

By checking the “Do Drills First” check box, all of the drill operations in the program will be executed first.
Tabbing Parts

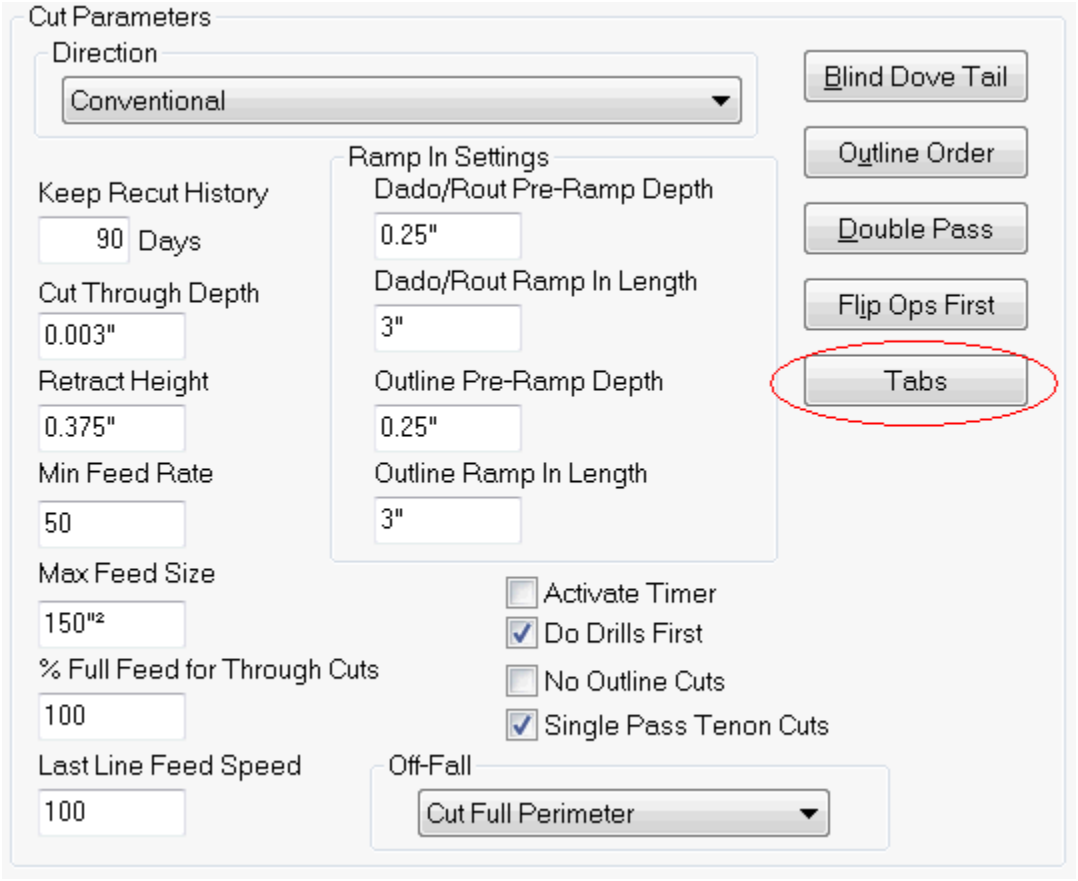
Tabbing Parts

When parts are too small to hold down with vacuum, the operator has the choice to use Tabs around the part. Tabs simply connect parts together to prevent movement.

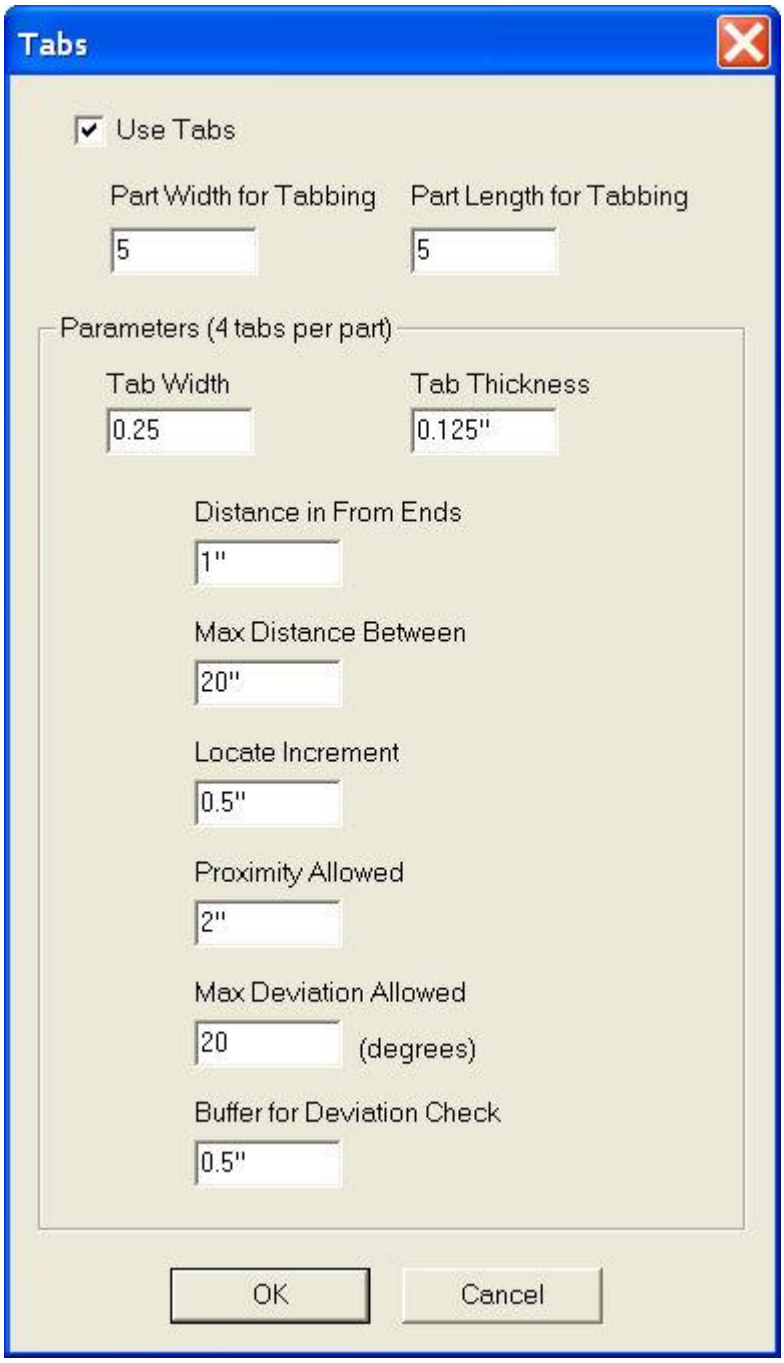
Control Nesting analyzes the perimeter of a part as well as the parts that are nearby. This is to insure that when an adjacent part is cut the tabs will not be cut. The display will show these resulting adjacent part tabs in a different color. Below is an example of a nest where the tabs are in blue and the adjacent tabs are orange.



Control Nesting analyzes the perimeter of parts for tabbing with a set of parameters. To set the tabbing parameters click the Tabs button in Settings.



Tab Parameters

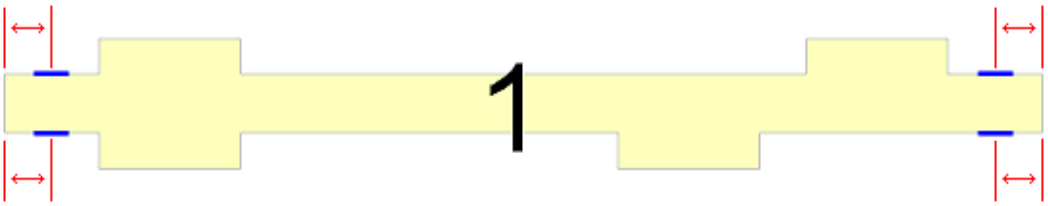


The *"*Tab*"* dialog defines the width of the tabs, the maximum width of the part to use tabs, and the maximum length of the part to use tabs. If we set the "*Part Width for Tabbing*" to 5 inches, then any part that has a width smaller than 5" will be tabbed. Note that the tabbing option is typically used for Model 53 machines. The following are other parameters that can be set to give Control Nesting an idea of how best to tab the parts for your job.

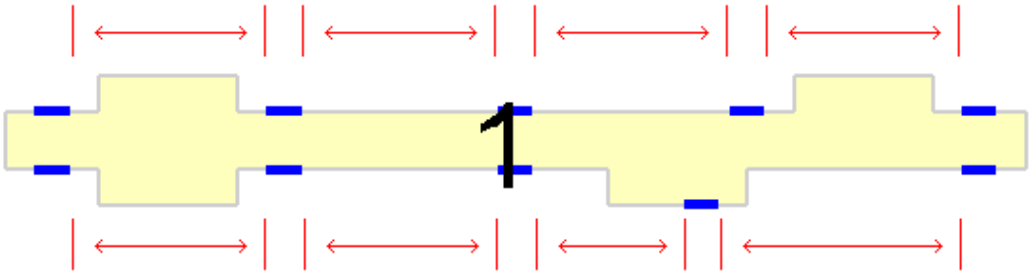
Tab Width: This will be the size for each tab that is applied to the part. The size is determined by the amount of distance along the perimeter of the part where the tab is created.

Tab Thickness: This will be the thickness of the resulting tab. Thickness is measured from the table top in the upward Z direction.

Distance in From Ends: This parameter tells Control Nest how far in from the ends of the part to begin placing tabs. Control Nesting will try to place a minimum of 4 tabs on a part. The image below shows how this amount is measured (red). The resulting tabs are displayed in blue.



Max Distance Between: This parameter will help Control Nesting determine whether or not to add more tabs between the ends of the part based on a maximum distance from the 4 tabs. This distance is where Control Nesting begins to locate additional tabs. The resulting location will not always be equal to the maximum distance. The value is depicted in red below.



Locate Increment: This value tell Control Nesting the step amount to walk along the perimeter of the part until a good location for a tab is found.

Proximity Allowed: The is the closest distance allowed between tabs. If the location on the perimeter is found to be suitable for tab placement but another tab exists within this location by this amount of distance then the new tab will not be created.

Max Deviation Allowed: When a spot is analyzed for tab placement the perimeter is checked based on it's deviation to avoid putting tabs in a notch or on a corner. The

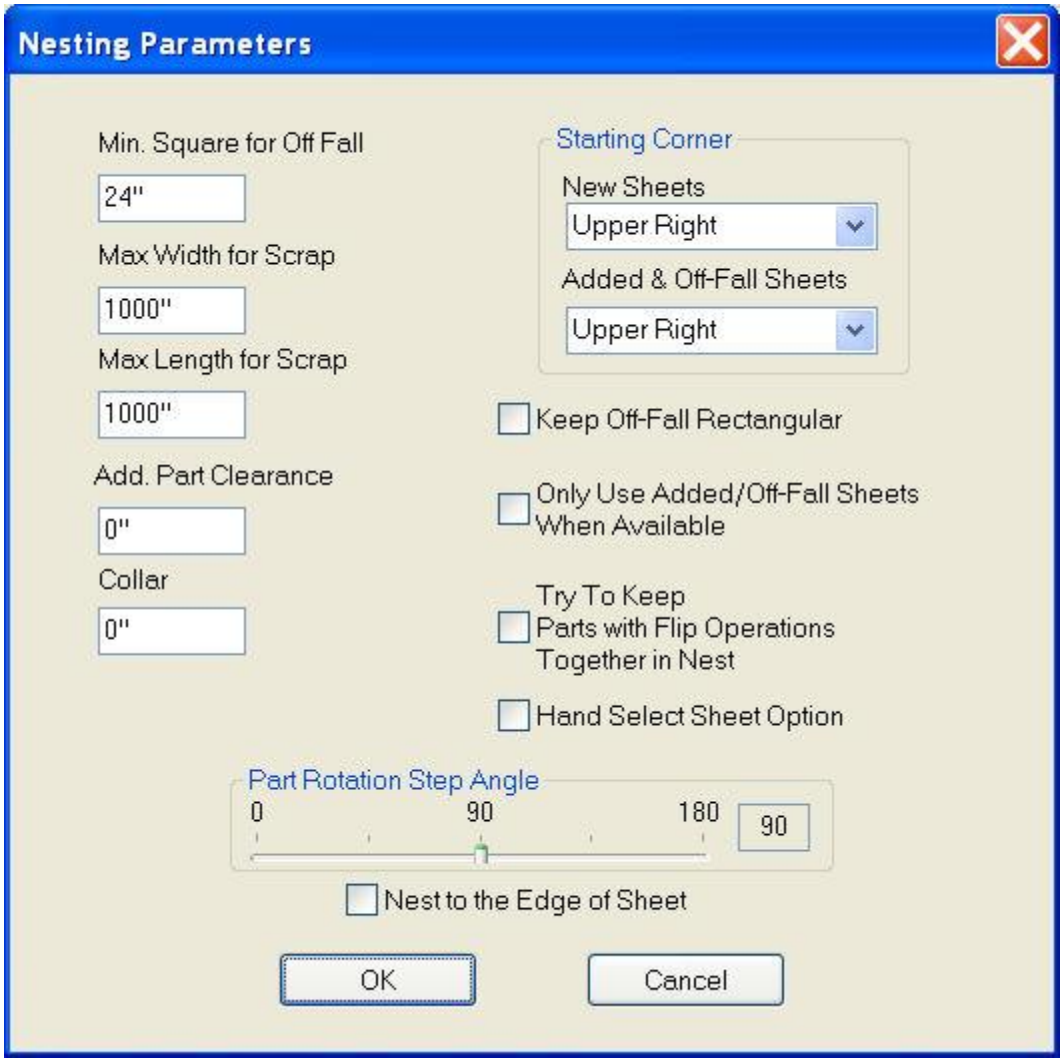
deviation value is in degrees. For example, a corner would create a 90° deviation. This deviation check is also perform for the location on an adjacent part if an adjacent tab is required for this location.

Buffer for Deviation Check: The amount of the perimeter that is analyzed for tab location is greater than the tab width by this amount. This is to avoid putting a tab too close to a notch, corner, or any other undesired location.
Nesting Parameters

Nesting Parameters

The button named *"Nesting Parameters"* opens a dialog which allows the user to determine size of off-fall, maximum size of scrap, additional part clearance, nest direction, collar, step angle, nest to edge, and starting corner. It also includes the option for Off-Falls to be rectangular, only nesting on Added Sheets or Off-Fall if they exist, and keeping parts with flip operations together on sheets.

The Nesting Parameters dialog can be accessed from the Settings dialog or the Edit menu.. The values respect and groups that are established.



Min. Square for Off Fall

The "Min. Square for Off Fall" field determines the area in which Control Nesting searches for off-fall (Scrap material that can be used). For instance, if the operator has a value of 12 inches set, Control Nesting will search every 12 inches square for off-fall. The smallest off-fall in this case, will be 12 inches square. Control Nesting will store the dimensions for the off-fall in a database, which may be found under the "Add Sheet(s)" button from the main menu. If the user does not wish to use off-fall, setting this value larger than the maximum sheet area will prevent Control Nesting from using it.

Add Part Clearance

The “Add Part Clearance” option is the value that increases the distance between parts. This is mainly used to prevent accidental gouging once a part has been machined, in case it moves during other operations. Part movement may be caused by insufficient hold down methods, parts being too small, etc.

Nest Direction

“Nest Direction” is the direction that Control Nesting will nest the parts. If the X axis is selected, parts will nest along the X axis. If Y is selected, the parts will nest along the Y axis.

Collar

“Collar” is the distance around the outside edge of the sheet stock that parts are to be nested within. Normally, an additional amount is added when the outside edges of the sheet are damaged.

Part Rotation Step Angle

“Part Rotation Step Angle” is a feature added to the Settings dialog to give the operator the ability to control the increments in which each part is rotated and tried when the nest is created. Example: If the step angle provided is 90 degrees, then the parts will be tried in 0, 90, 180, and 270 degrees. This value is what is used for non-grain material nests to rotate parts for optimal nesting.

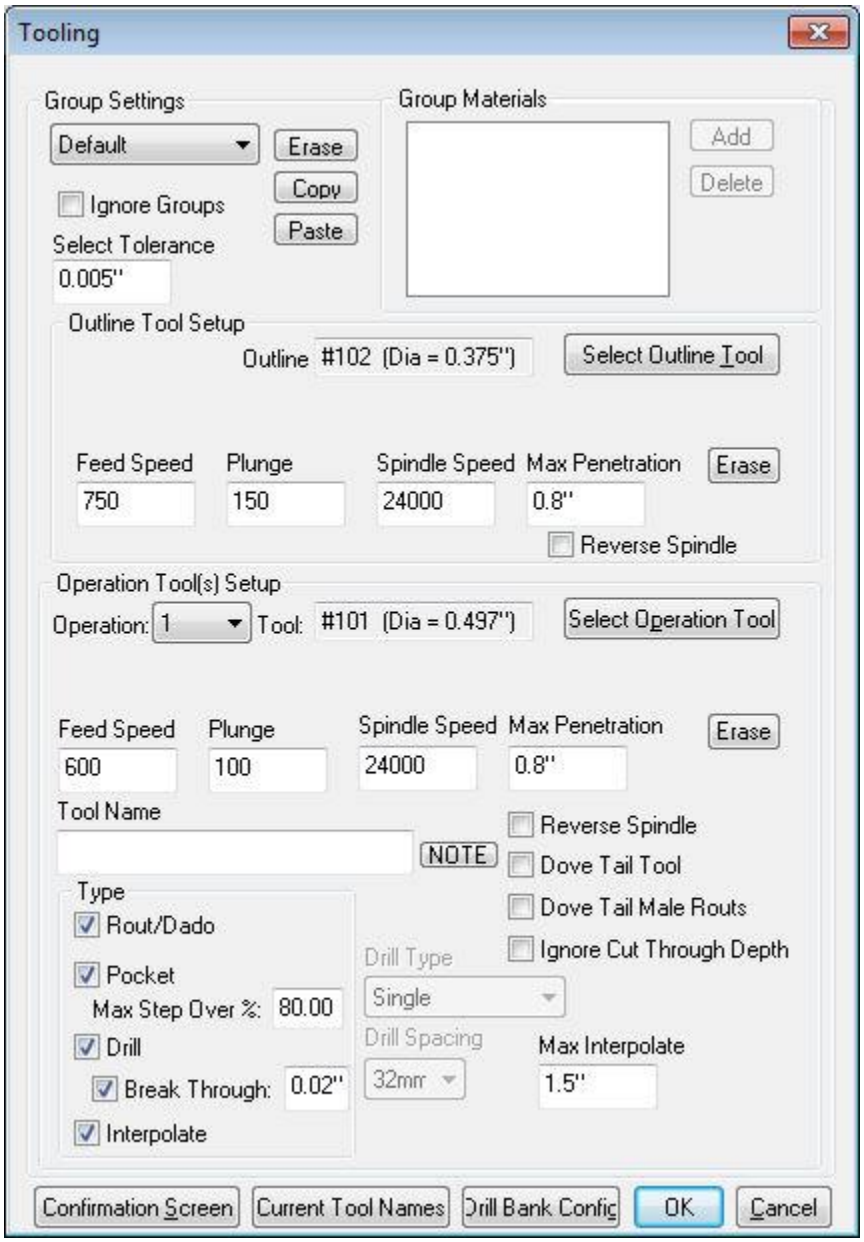
Nest to the Edge of the Sheet

The “Nest to the Edge of the Sheet” check box will allow the operator to nest parts directly along the edge of the sheet of material. By default Control Nesting will leave the radius of the outline tool around the edge of the sheet when creating a nest and then any Collar amount will be added to that number. If the collar is set to zero and the Nest to the Edge of the Sheet is checked, parts will be nested to the edge of the material when creating the CNC code.

Tooling

Tooling

This is where all Control Nesting tools are defined. Each tool will need to be set up in Tool Management on the Thermwood Control Prior to setting up the Operations here.



Select Tool Tolerance

This value will tell Control Nesting what tolerance to use when selecting the proper tool for an operation. The tolerance value is applied to the diameter of the tool. For example, if an operation calls for a tool with a diameter of 0.25" and the tool at the control that will work for this operation is actually 0.245 a tolerance of 0.006" will allow this tool to be selected for the operation.

Tooling Group

The purpose of tooling groups is to allow a group of tools to be used for specific materials. Currently, Rolling Nest allows 50 different tooling groups to be defined. To set up a tooling group, the operator must first define which group by using the pull-down menu. Once this has been selected, the operator must set the materials that they wish to use for this tool group.

An entire Group setting can be erased by clicking the Erase button next to the Group name.

Group Materials

The materials that each tool group is used on is specified in the "Group Materials" section. Notice the "*Add*" and "*Delete*" buttons. By pressing the "Add" button, a dialog box will appear in which the operator may add materials from the database or create their own. After doing this, the material name(s) will appear in the white window. To delete a material, highlight the name and press the "Delete" button.

Ignore Groups

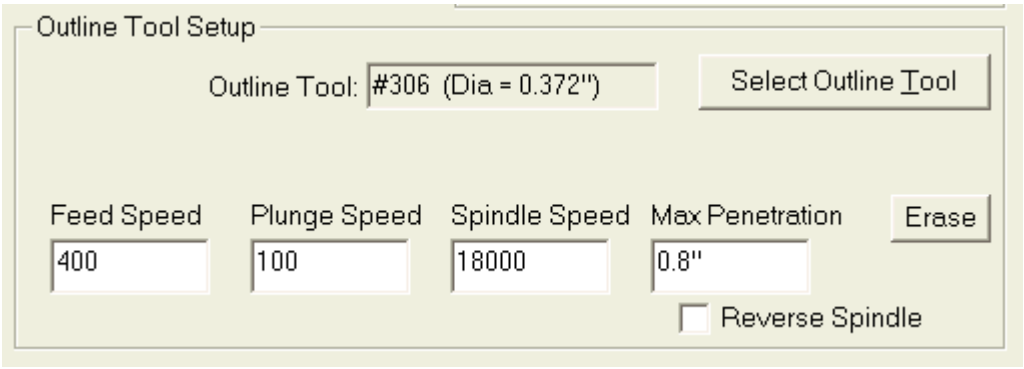
If the operator does not wish to use tooling groups, Rolling Nest will use the tools specified under the Default group, once the "*Ignore Groups*" box has been checked. Now we must select the tooling to use for a tooling group, or the default group. Control Nesting only allows tools that are correctly set up in the 91000 Super Control's Tool Table. The tool table can be accessed by exiting Control Nesting and pressing the F9 (Tool Management), then F2 (Tool Table) keys on the keyboard.

Outline Tool Setup

The first tool is defined in the "Outline Tool Setup" section. This section defines the tool to be used for all perimeter (outline) cuts. By pressing the "*Select Outline Tool*" button, a dialog box will appear with a list of tools that are currently setup in Thermwood's Tool Table. To view the details of a tool, highlight it and press the "Details" button. To select the tool for use, highlight it and press OK, or just double-click the tool. Note that Control Nesting also uses the tool's diameter to determine the distance between parts when nesting. Once the tool has been selected, the operator must set the "*Feed Speed*", "*Plunge Speed*", *"Max Penetration"*, and "*Spindle Speed*". If the machine is configured for it, the operator has the option to choose the "*Reverse Spindle*" option.

The *"Max Penetration"* setting keeps a tool from being used at a depth greater than this amount in 1 pass. If a depth of cut is greater than this amount Control Nesting will

perform the operation in incremental passes at the *"Max Penetration"* amount until the operation is complete.



Operation Tool(s) Setup

All other tooling will be defined in the "Operation Tool(s) Setup" section. Control Nesting has the option to setup 50 different operations. To start, choose an operation number from the pull-down menu. Then select the "*Select Operation Tool*" button and choose a tool. Now we need to define the operation(s) that we would like to use this tool for. This can be done by selecting the appropriate operation(s) under the "***Type***" section. Only now can we set the "*Feed Speed*", "*Plunge Speed*", "*Spindle Speed*", *"Max Penetration"*, and "*Reverse Spindle*". These fields are grayed out until the operator chooses an operation type.

Tools specified as "*Pocket"* will be used in Pocketing operations. The pocketing feature will search through the list of Operation Tools set to "Pocket" then sort them from largest diameter to smallest diameter. On each pocket operation the tools will be used in this order until either the minimum leftover area is satisfied or the tool list is complete. "*Step Percentage*" is the amount the tool will step over each cut pass based on a percentage of the tool diameter.

The *"Max Penetration"* setting keeps a tool from being used at a depth greater than this amount in 1 pass. If a depth of cut is greater than this amount Control Nesting will perform the operation in incremental passes at the *"Max Penetration"* amount until the operation is complete.

The *"Drill Type"* setting tells Control Nesting what type of drill a particular tool number is designed to accomplish. This is where drill bank options are established.

X3 Y3 X5 Y5 CX3 CY3 CX5 CY5:

A 3 and 5 drill bank is designated in THM Tool Management by setting the tool number's actuator position number to designate the CENTER drill bit. The X bank will be a separate tool number from the Y bank. This logic was put in place to handle any different number of positions. That is why the actuator position number is critical.

Control Nesting understands that the actuator position is the CENTER of the bank. If your drill bank is mounted to a C axis then the C options should be selected.

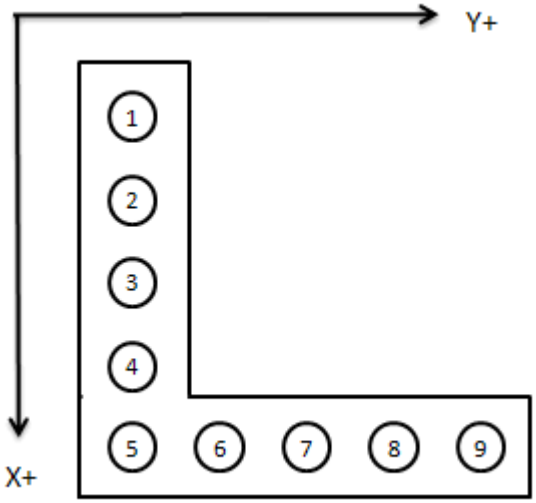
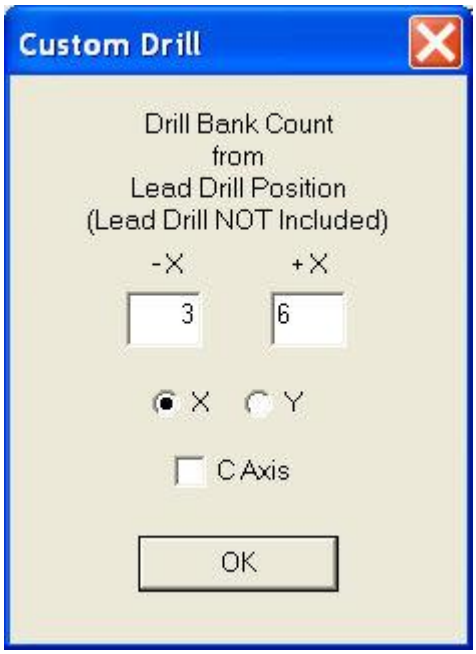


Fig. 1

Drill Bank Example:
If your drill bank is like Fig. 1 you would set the actuator position to 3 for the X axis tool number and 7 for the Y axis tool number in THM Tool Management.. Then in the Tooling section of Control Nesting you would set the Drill Type to X5 for the Operation Tool using your X axis tool number and Y5 for the Operation Tool using your X axis tool number. If you only wish to use 3 drills then you pick the center actuator position number for the tool number in THM Tool Management and then designate that Tool Operation as X3 or Y3.

Custom:

The Custom option for Drill Type gives the ability to set up larger drill banks as well as bank counts other than 3 or 5. This setting allows the designation of the lead drill along with the count of drill bits before and after. The designation is determined based on the positive (+) or negative (-) direction. In the following image a custom drill operation of 3X5 has been entered. This means that the bank is along the X axis and there are 3 bits in the negative direction from the lead bit and 6 bits in the positive direction from the lead bit. This makes a total of 10 bits. The tool number in THM Tool Management that will be selected for this operation should have an actuator position number set to the value that allows these counts to be accurate.

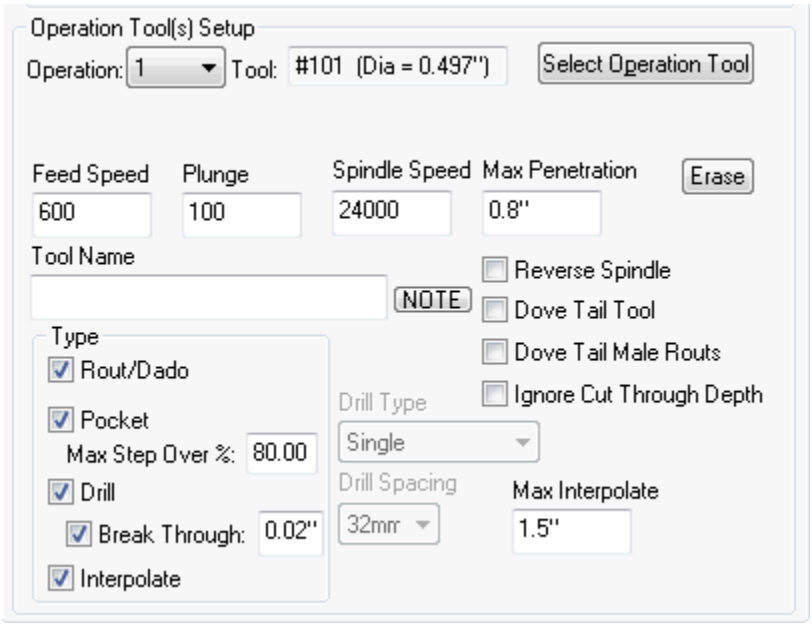


Notice the "*Interpolate*" selection. With this selected, we are allowing that tool to be used for any circle interpolation that may be needed. Also, with this selected we are now able to set the "*Max Interpolate Diameter*" field. The "*Max Interpolate Diameter*" field allows the user to limit the size of hole to machine with that tool. Normally, when drilling a hole with a high RPM, there is a risk of burning the material or damaging the tool. Interpolating a hole will prevent this from happening.

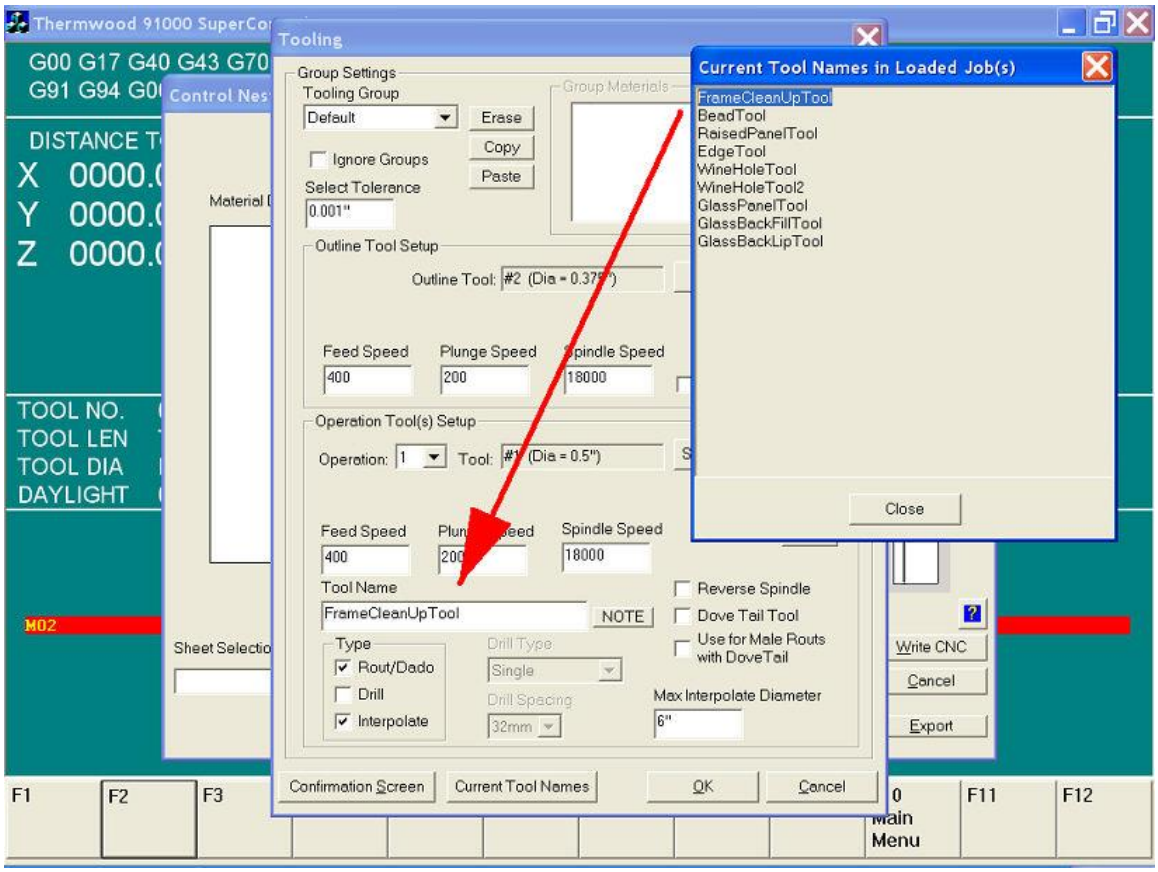
Dove Tail tool specifications can as be set with *Dove Tail Tool* and *Dove Tail Male Routs* check boxes. The *Dove Tail Tool* check box is to designate the tool is a Dove Tail Tool. The *Dove Tail Male Routs* check box is to designate this tool is to be used to cut the male ends of the dove tail joint if and only if the tool diameter is small enough to perform the radius cuts that are present in a particular joint.

Ignore Cut Through Depth will stop Control Nesting from adding the Cut Through Depth to an operation that is a through cut with this tool.

Break Through will apply the specified amount to the depth of the drill operation when the drill operation is a through cut. When enabled this value is used in place of the specified Cut Through Depth amount in Settings.

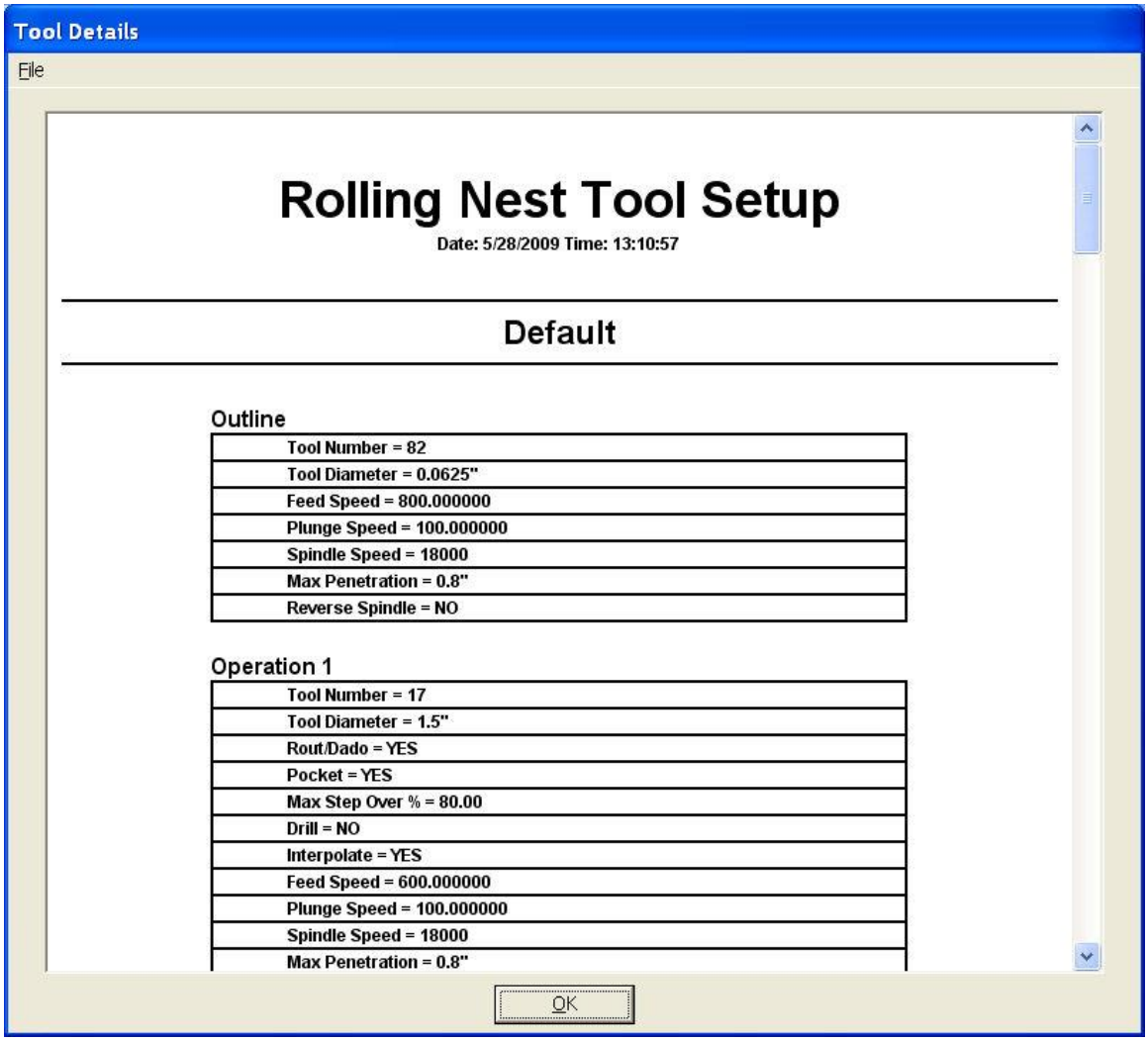


Some jobs such as MDF Doors can require special tooling. For these jobs the tool recognition is done by using Tool Names. Go to Tooling to designate these tools. Clicking on Current Tool Names button will open a dialog specifying the tool names in the currently loaded job. If the job does not contain any tool name then this dialog will not display. These tool name can be copy/paste into the Tool Name entry box for the appropriate operation tool. Now Control Nesting will select this tool for the appropriate operation in the job.



Confirmation Screen

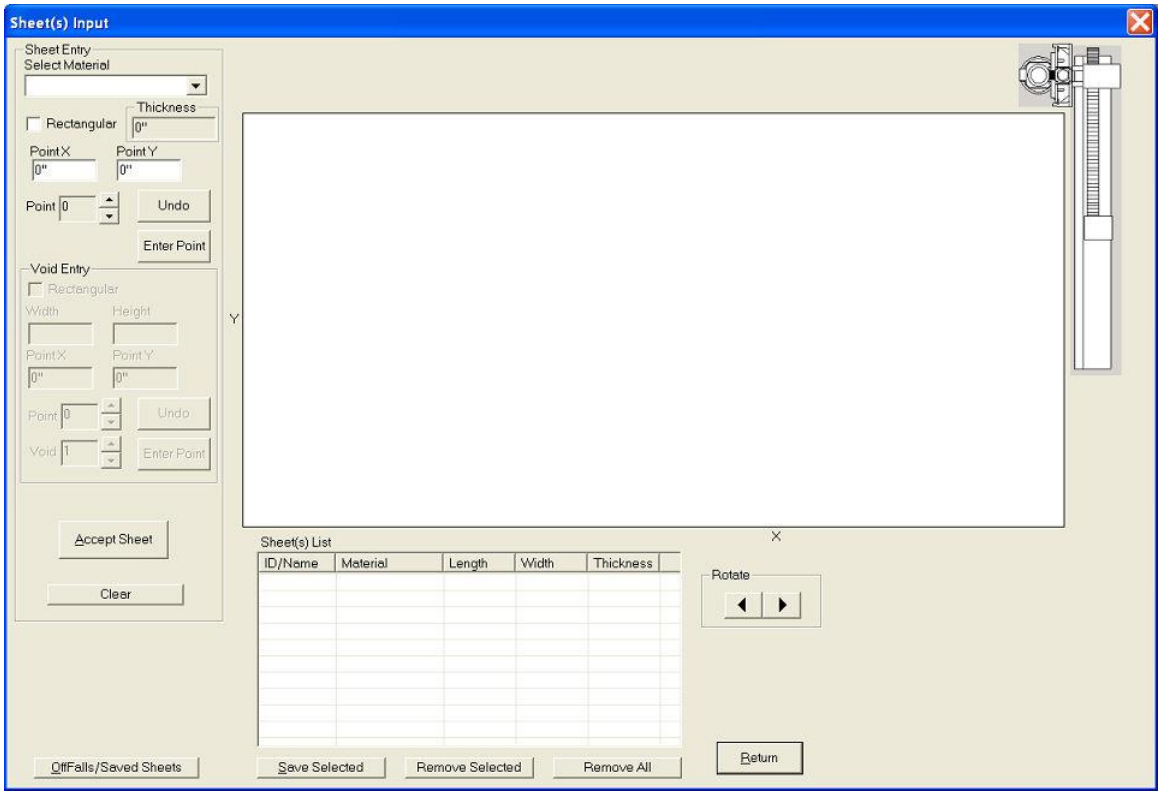
The “Confirmation Screen” button allows the user to review all settings that have been made in the “Tooling” section of Rolling Nest.


Tool Details
File
Rolling Nest Tool Setup
Date: 5/28/2009 Time: 13:10:57
Default
Outline
Tool Number = 82
Tool Diameter = 0.0625"
Feed Speed = 800.000000
Plunge Speed = 100.000000
Spindle Speed = 18000
Max Penetration = 0.8"
Reverse Spindle = NO
Operation 1
Tool Number = 17
Tool Diameter = 1.5"
Rout/Dado = YES
Pocket = YES
Max Step Over % = 80.00
Drill = NO
Interpolate = YES
Feed Speed = 600.000000
Plunge Speed = 100.000000
Spindle Speed = 18000
Max Penetration = 0.8"
OK

Adding Sheets and/or Off-fall

Adding Sheets and/or Off-Fall

A dialog box resembling the following picture will appear when selecting the Add Sheet(s) button. To begin, a job must be loaded before entering any irregular shaped scrap, undersized sheet stock, or off-fall left from prior nests. Off-fall can be added by scanning the barcode at this time or selecting from the Off-fall Library. The material entered in this section may be used in future nests, as long as the material name matches the part material. Once everything is completed under the Add Sheet(s) section, the operator may select the Return button to get back to the main menu.



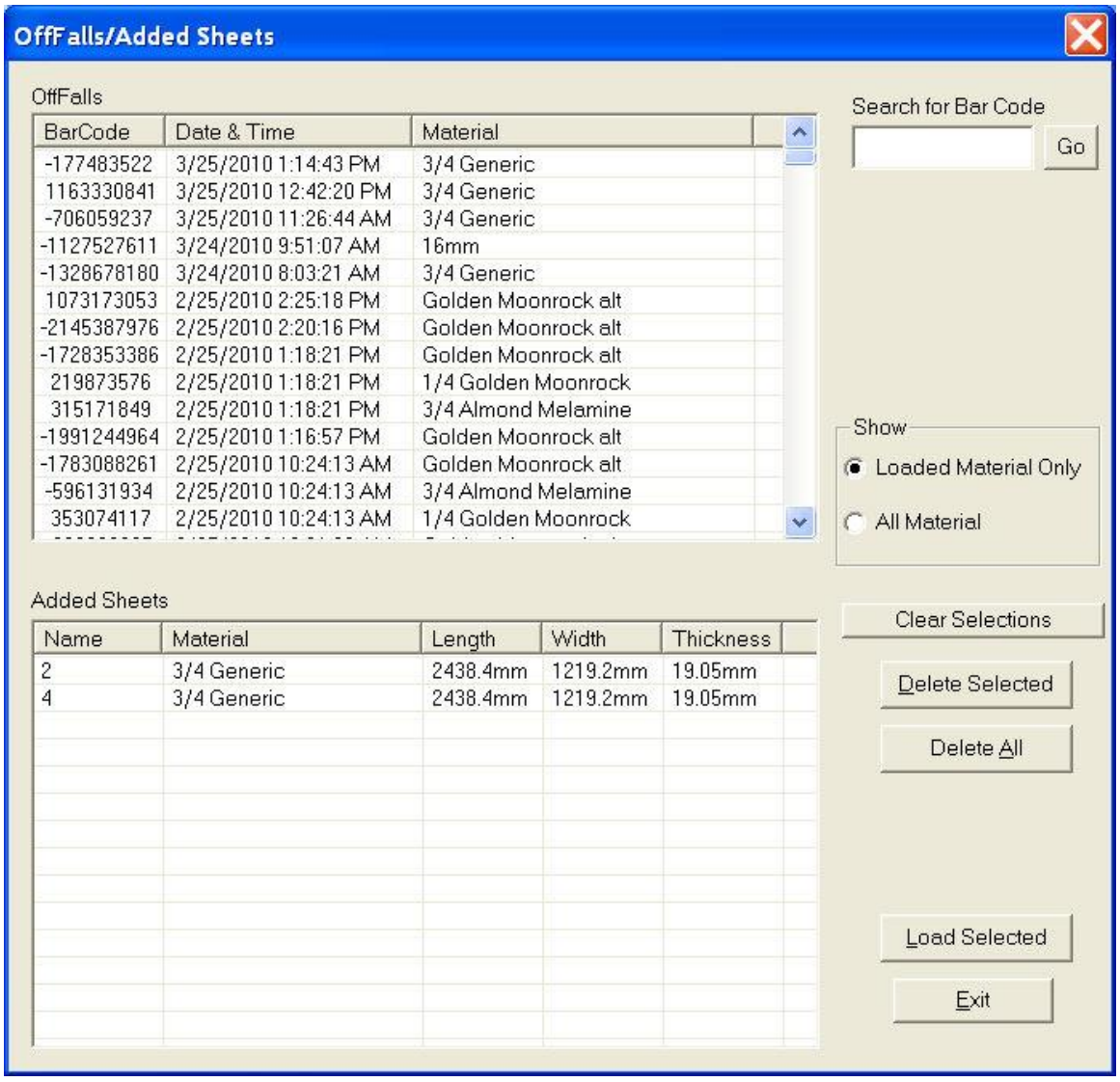
Off-Fall Library

OffFalls/Added Sheets

To access the saved OffFalls/Added Sheets and view the material that is listed, select the "OffFalls/Saved Sheets" button. This will bring up a dialog box resembling the following picture.

Items can be selected for loading into the Sheet(s) Input dialog or deleting. Only material that is currently loaded in Control Nesting can be loaded. You can view all materials by selecting the All Material option.

To change the Name of an Added Sheet you must click on the Name then enter the new name.


OffFalls/Added Sheets
OffFalls
BarCode | Date & Time | Material
-177483522 | 3/25/2010 1:14:43 PM | 3/4 Generic
1163330841 | 3/25/2010 12:42:20 PM | 3/4 Generic
-706059237 | 3/25/2010 11:26:44 AM | 3/4 Generic
-1127527611 | 3/24/2010 9:51:07 AM | 16mm
-1328678180 | 3/24/2010 8:03:21 AM | 3/4 Generic
1073173053 | 2/25/2010 2:25:18 PM | Golden Moonrock alt
-2145387976 | 2/25/2010 2:20:16 PM | Golden Moonrock alt
-1728353386 | 2/25/2010 1:18:21 PM | Golden Moonrock alt
219873576 | 2/25/2010 1:18:21 PM | 1/4 Golden Moonrock
315171849 | 2/25/2010 1:18:21 PM | 3/4 Almond Melamine
-1991244964 | 2/25/2010 1:16:57 PM | Golden Moonrock alt
-1783088261 | 2/25/2010 10:24:13 AM | Golden Moonrock alt
-596131934 | 2/25/2010 10:24:13 AM | 3/4 Almond Melamine
353074117 | 2/25/2010 10:24:13 AM | 1/4 Golden Moonrock
Search for Bar Code
Go
Show
Loaded Material Only
All Material
Added Sheets
Name | Material | Length | Width | Thickness
2 | 3/4 Generic | 2438.4mm | 1219.2mm | 19.05mm
4 | 3/4 Generic | 2438.4mm | 1219.2mm | 19.05mm
Clear Selections
Delete Selected
Delete All
Load Selected
Exit

Load Selected

The Load Selection button allows the operator to load the selected OffFalls and/or Added Sheets from the lists into the Sheet Input dialog. This will make the item(s) available for Nesting. To make multiple selections you can either hold the Ctrl key or Shift key while left clicking on the item.

Delete

There are 2 methods for deleting, Delete Selected and Delete All. Delete Selected will delete all the items that are currently selected in BOTH lists. Delete All will delete ALL the items in BOTH lists.

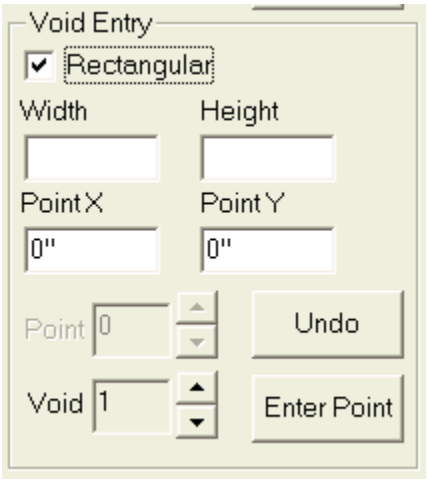
NOTE: Only the items in the list will be Deleted. If you have Loaded Material Only selected then all the OffFall/Added Sheets that are NOT made of currently loaded material will not be deleted.
Sheet Entry

The first section is called "Sheet Entry." "Select Material" is where the operator will enter a material name, or choose from the pull-down menu. If the material name doesn't match the part material, then Control Nesting will not use it. If it is rectangular, check the field next to "Rectangular**"** and enter the dimensions for "*Length*" and "*Width*." To the right, Control Nesting will draw the rectangular scrap. If the material is not rectangular, un-check the "*Rectangular*" field and enter points into the "Point X" and "Point Y" fields. This requires that the material be drawn in a point-to-point fashion. Selecting "Enter Point" will place the point in the large window. If any of the points have been entered incorrectly, "Undo**"** may be selected to start over. **The points entered must create a closed contour.**

NOTE: The sheet entry must be entered from the 0,0 reference point at the top right corner of the table.

Void Entry

The next section is called “Void Entry.” It allows the user to specify a bad section within the sheetl; Control Nesting will not nest any parts into these sections Voids can not be created until a sheet is created. The void is drawn in a point-to-point fashion or by specifying a rectangle center point, width, & height. When entering point by point, once a closed loop is created the Void is complete and the Void number increments so that you may continue to create Voids if you wish. The Undo button will remove the current point in the current Void or remove the rectangle if that was the input technique used to create the Void. If all points are undone then that Void is removed.



Rotate

Rotate allows the operator to rotate the current data. It is done in 90° increments. The left arrow rotates counter-clockwise and the right arrow rotates clockwise.

Sheet(s) List

This list contains the Sheets created and/or OffFalls/Added Sheets loaded that will be used when nesting.

The ID/Name column will either contain the OffFall ID for OffFall entries or a Name for Added Sheets. The Name can be altered for Added Sheets by clicking the Name for an entry. It gets the value "Added" by default. OffFall ID can not be altered.

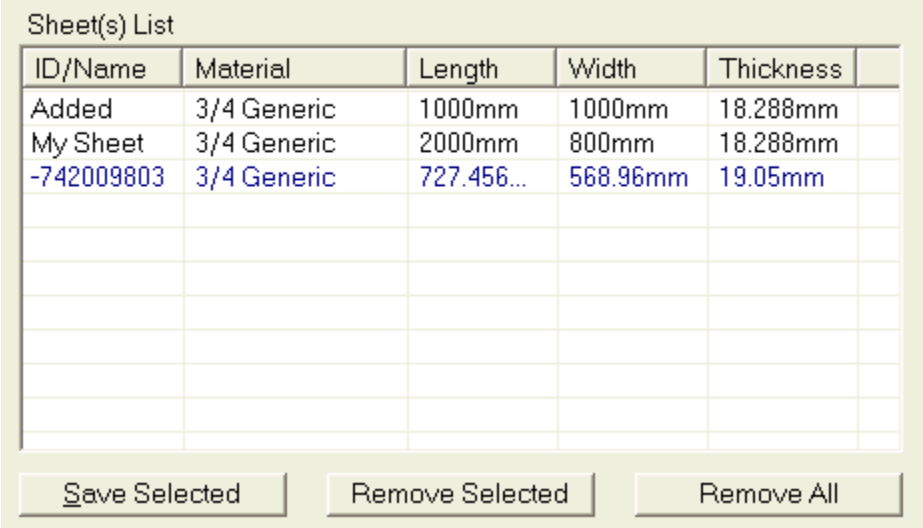
The Save Selected button will save any selection to the Added Sheet database. The saved sheets can be accessed by clicking OffFalls/Saved Sheets button.

Removed Selected will remove the selected items from the list so that they will not be considered for Nesting.

Remove All will remove all items in the list.

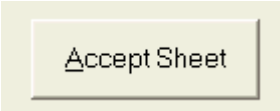
The Remove options will NOT delete any Saved Sheets or OffFall. It only removes them from Nesting consideration.

To Load an item in the list click on that entry. The sheet or offfall can now be altered. Then the changes can either be applied to that entry or added as a new entry. The Apply and Add as New buttons are available on the left when an item from the list is selected for this purpose.



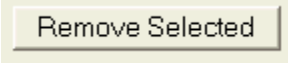
Accept Sheet

Once all sections are completed, selecting the Accept Sheet button will place the material into the Sheet(s) List window. This will create a new entry in the sheet list to make it available for Nesting.



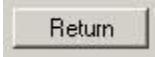
Remove Selected

Too remove sheets from the Sheet(s) List window, the operator must highlight the sheet and then select the Delete Sheet button. Any material in the Sheet(s) List window will be used in the next nest, if possible. By removing a sheet from the list this stop this sheet from being used for nesting. Remember, the material name must match the part material name in order to use it.



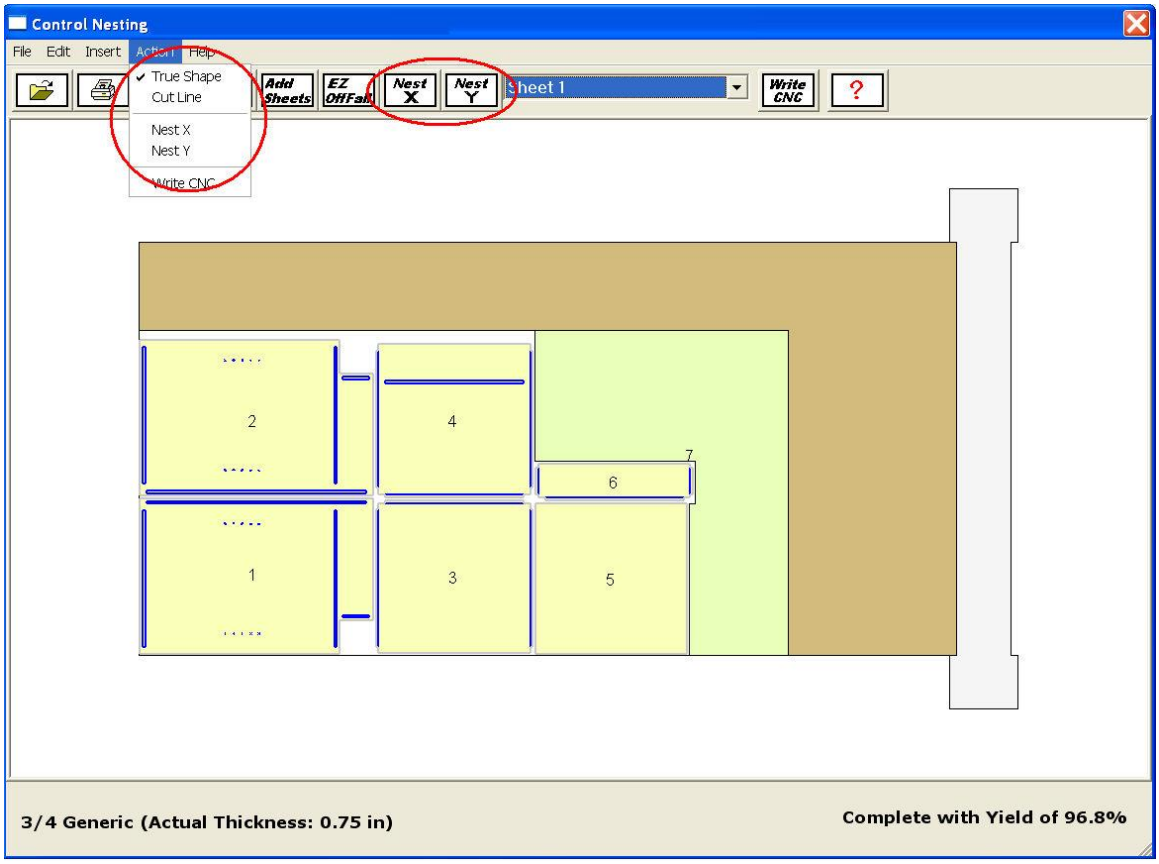
Return

The Return button will return operator to the main Control Nesting screen if selected.



Nesting

Control Nesting is now ready to begin nesting the TWD, MDB or DXF file(s) that were loaded earlier.

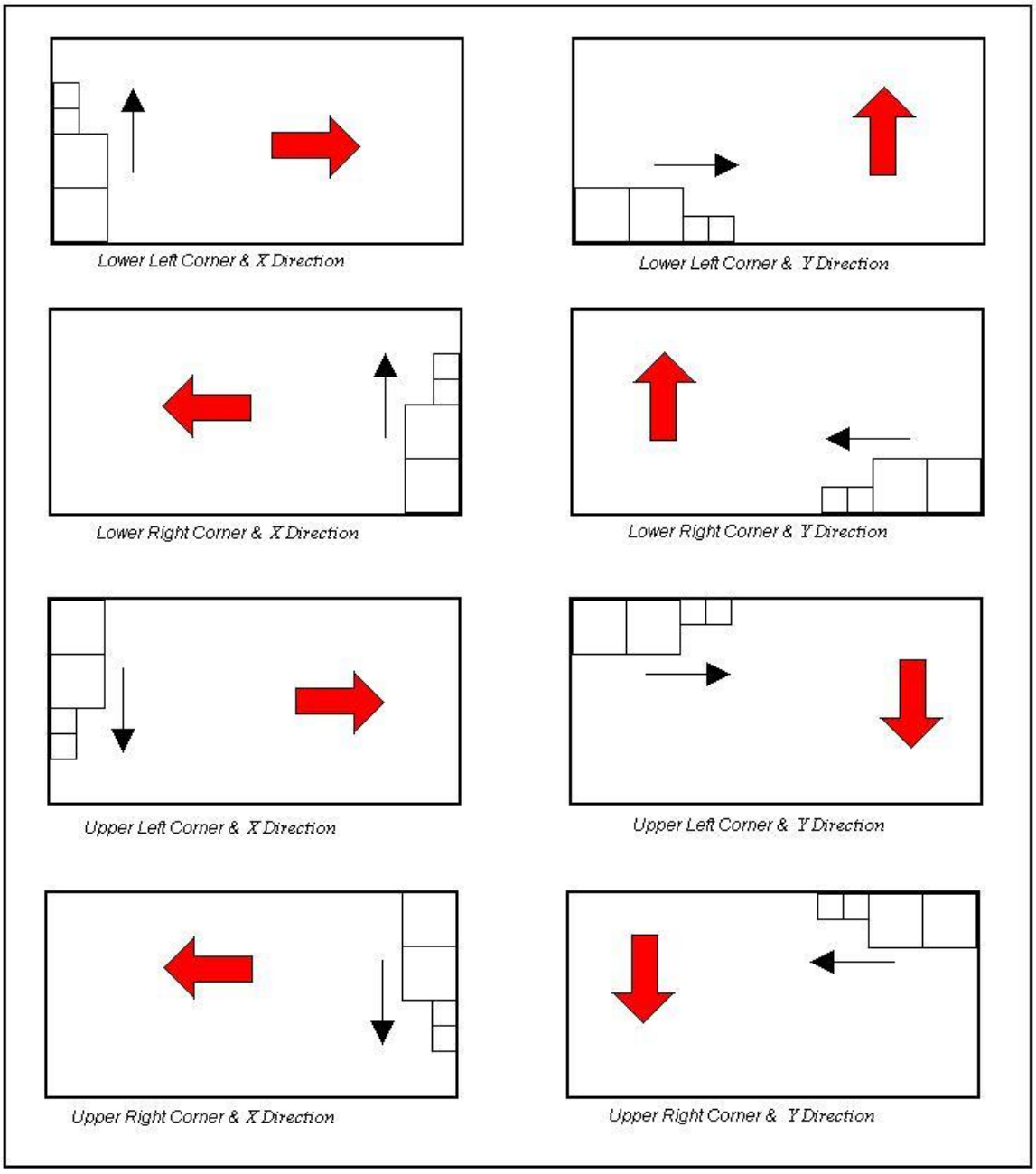


There are 2 Nesting methods that can be selected. True Shape and Cut Line. The options can be set in the Action menu. True Shape method will try to fit the parts tightly to the starting corner allowing them to interlock among each other if possible. Cut Line nesting will fit the parts while trying to leave a common edge between them.

The nest will be based off of the previous inputs. Along with the nest, a yield percentage, material type, and number of sheets used will be displayed. To scroll through the sheets in the nest to view, simply click on the drop down arrow and select the sheet you want to view.

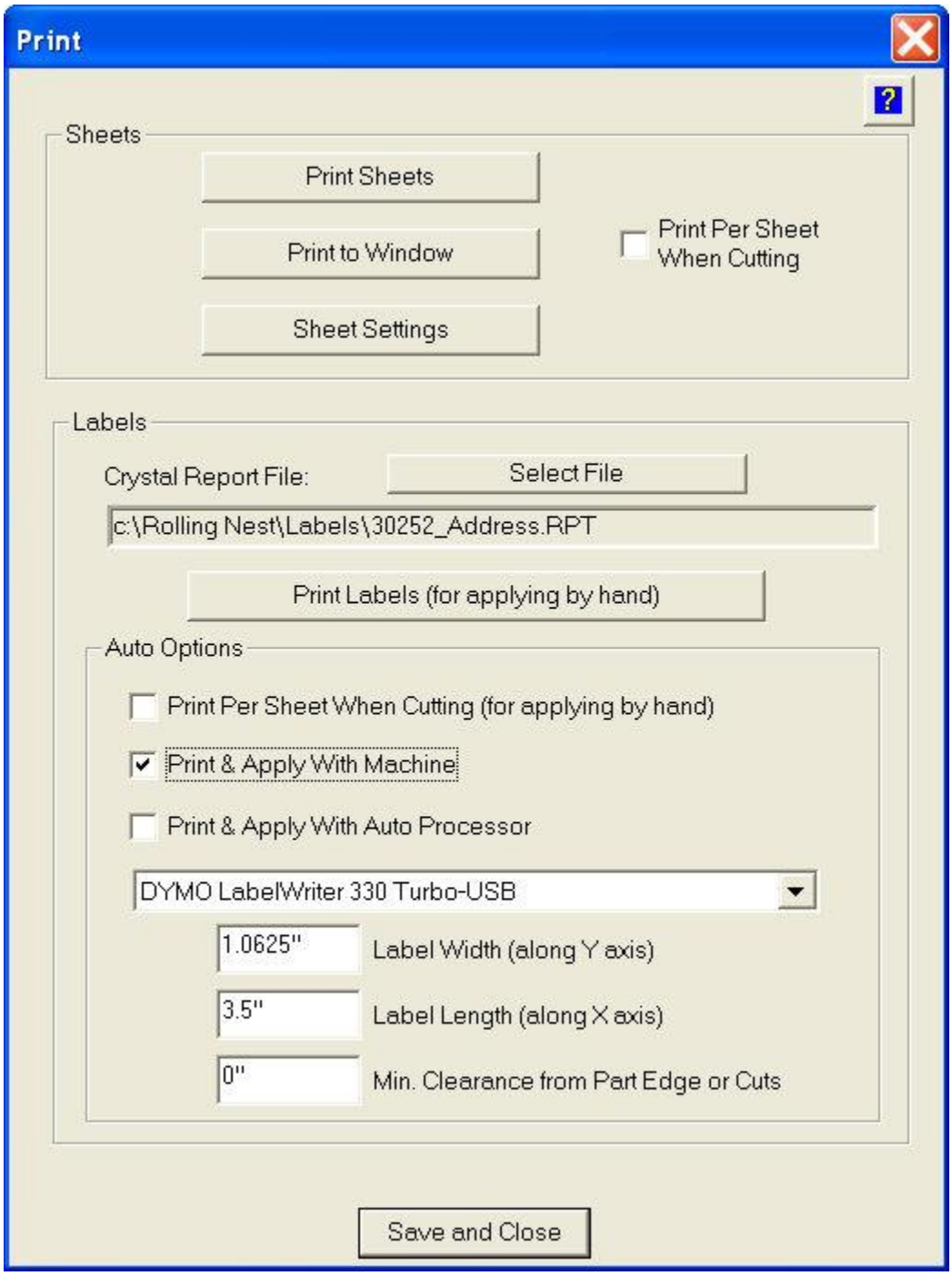
By selecting the Nest X or Y button, Control Nesting will display a layout of the nest onto the machine diagram, as shown below. Using the X button means the nest with progress along the X axis. Using the Y button means the nest will progress along the Y

axis. The following image illustrates how the nesting occurs based on the direction and starting corner. (see Starting Corner in Nesting Parameters)


Lower Left Corner & X Direction
Lower Left Corner & Y Direction
Lower Right Corner & X Direction
Lower Right Corner & Y Direction
Upper Left Corner & X Direction
Upper Left Corner & Y Direction
Upper Right Corner & X Direction
Upper Right Corner & Y Direction

Printing

If the operator wants to print labels and a nest layout, they can select the “Print ” button and the following dialog box will appear.



Printing Sheets:

Selecting the option "Print Per Sheet When Cutting" will enable Control Nesting's ability to print a single sheet of the currently cutting sheet. The printing will begin when the Start button is pressed to begin cutting that particular sheet. NOTE: This option only works properly when the program running is the last program that was generated by Control Nesting.

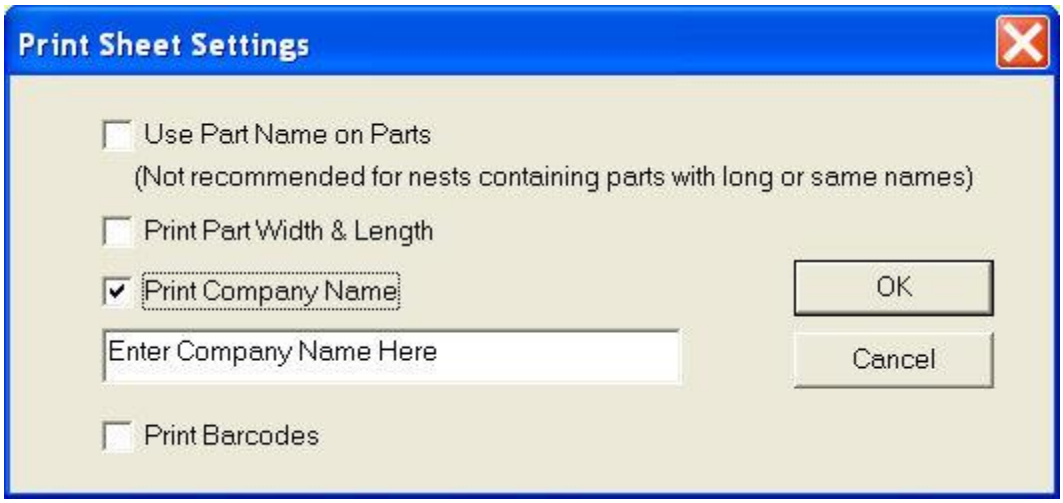
Print Sheets will perform the printing for the selected Sheet Settings.

Print to Window will create bitmaps of printed sheets and put them in the c:\Rolling Nest\SheetImages directory. Then they are displayed using Windows Picture Viewer.

Sheet Settings will take you to the following dialog where options for the printed sheet can be set.

Print Barcodes offers a barcode to be printed on the page. These barcodes can be scanned to print a single label or to re-print the page using the Label Recovery option in Thermwood Control Software. (requires Thermwood Control Software version 8.3.0 or newer).

NOTE: When using the "Use Part Name on Parts" option you must keep in mind that if you have parts with long names it could appear messy. Plus if the nest contains multiple parts with the same name it will be difficult to depict where a part is located in the nest. This option is recommended for jobs with simple unique part name strategies.



Printing Labels:

Print Labels will bring up a dialog box to perform label printing. The labels will be printed based on the Crystal Report file selected. Click the Select File button to select a Crystal Report file. The files provided with Control Nesting are located in the C:\Rolling Nest\Labels directory.

Auto Options

"Print Per Sheet When Cutting" will enable Control Nesting's ability to print only the labels for the current sheet prior to cutting each sheet. The printing will begin when the Start button is pressed to begin cutting that particular sheet. NOTE 1: This option only works properly when the program running is the last program that was generated by Control Nesting OR the program is a CNC Database. (Only available with THM 7.6 or newer.)

"Print & Apply With Machine" will enable the machine labelling feature. If a machine is equipped with a labeling device it will automatically print and place the labels on each part prior to cutting each sheet. (Only available with THM 8.3 or newer with PLC version 2.0.3 or newer.)

"Print & Apply With Auto Processor" will enable the auto processor labelling feature. If your machine is an Auto Processor this setting is required to inform Control Nesting that an autoloader with labeling device is attached and ready for printing labels, placing labels, and loading sheets. (Only available with THM 8.3 or newer with PLC version 2.0.3 or newer.)

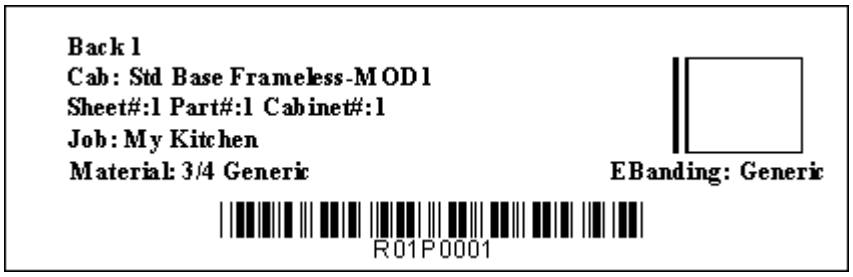
The values Label Width, Label Length, and Min. Clearance from Part Edge or Cuts are used for placing labels on parts. They are only needed for the Print & Apply With Machine and Print & Apply With Auto Processor options. These values do not affect the rpt that is used for the printing. It is up to the user to insure that the size values match the actual labels that are printed. This insures that there is room for the label and it will not get cut into. If a label does not fit on the part it is not placed.

The following is a list of the available Crystal Report files with a label type and an example of the data they display per label.

NOTE: Files with the word "Barcode" in the title will only print labels with barcodes. Files with the work "Recut" in the title will include a barcode on each part label that can be scanned for loading to recut.

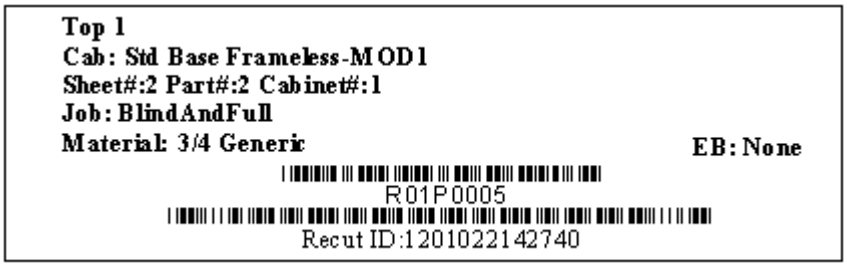
30252_Address.rpt & 30252_Address_Barcode.rpt

Label Type: Dymo label printer with 30252 Address labels



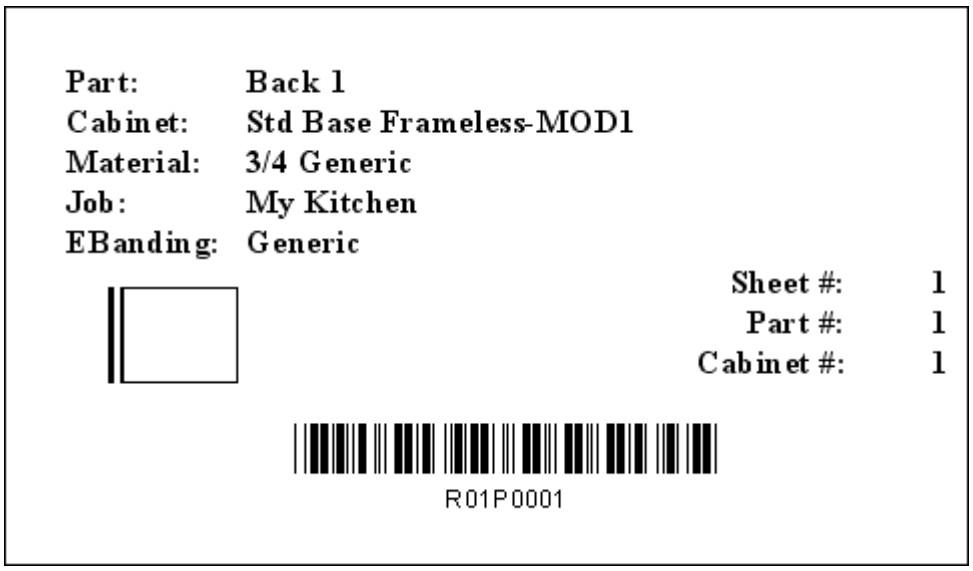
30252_Address_Recut.rpt

Label Type: Dymo label printer with 30252 Address labels



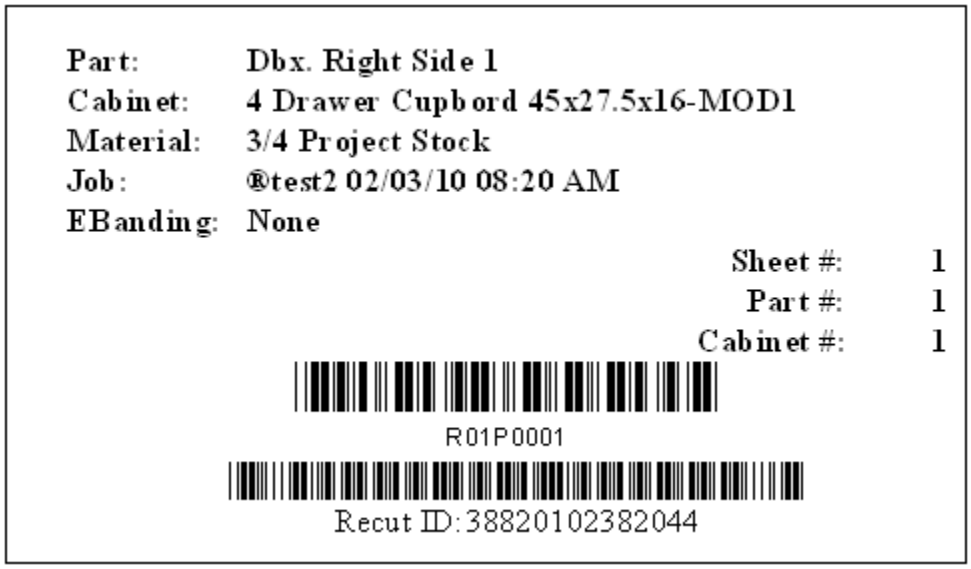
30256_Shipping.rpt & 30256_Shipping_Barcode.rpt

Label Type: Dymo label printer with 30256 Shipping labels



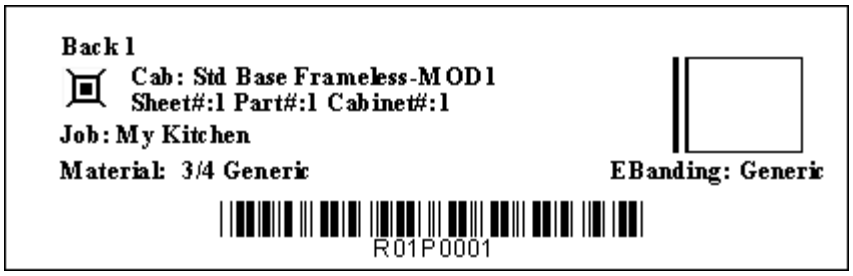
30256_Shipping_Recut.rpt

Label Type: Dymo label printer with 30256 Shipping labels



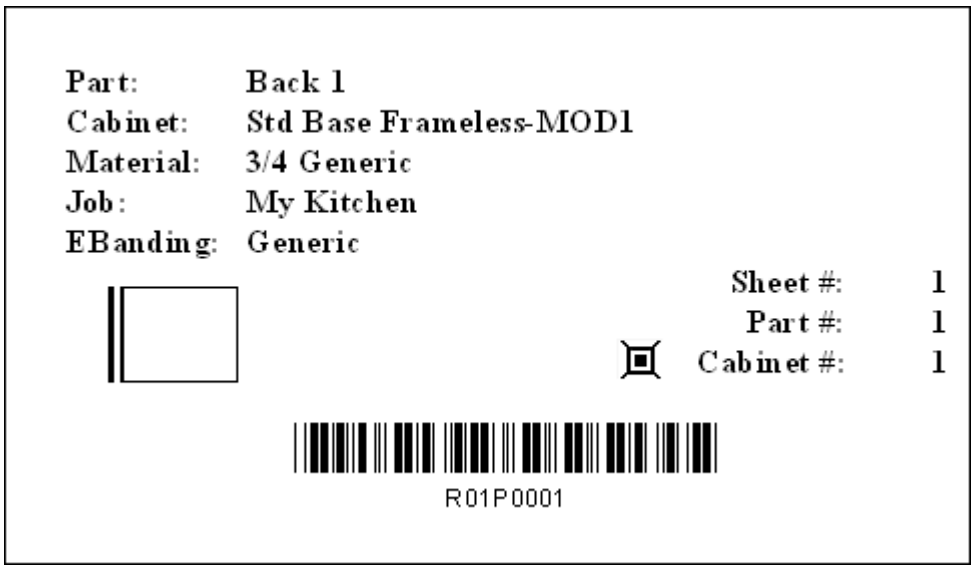
30252_Address_Symbol.rpt & 30252_Address_Symbol_Barcode.rpt

Label Type: Dymo label printer with 30252 Address labels



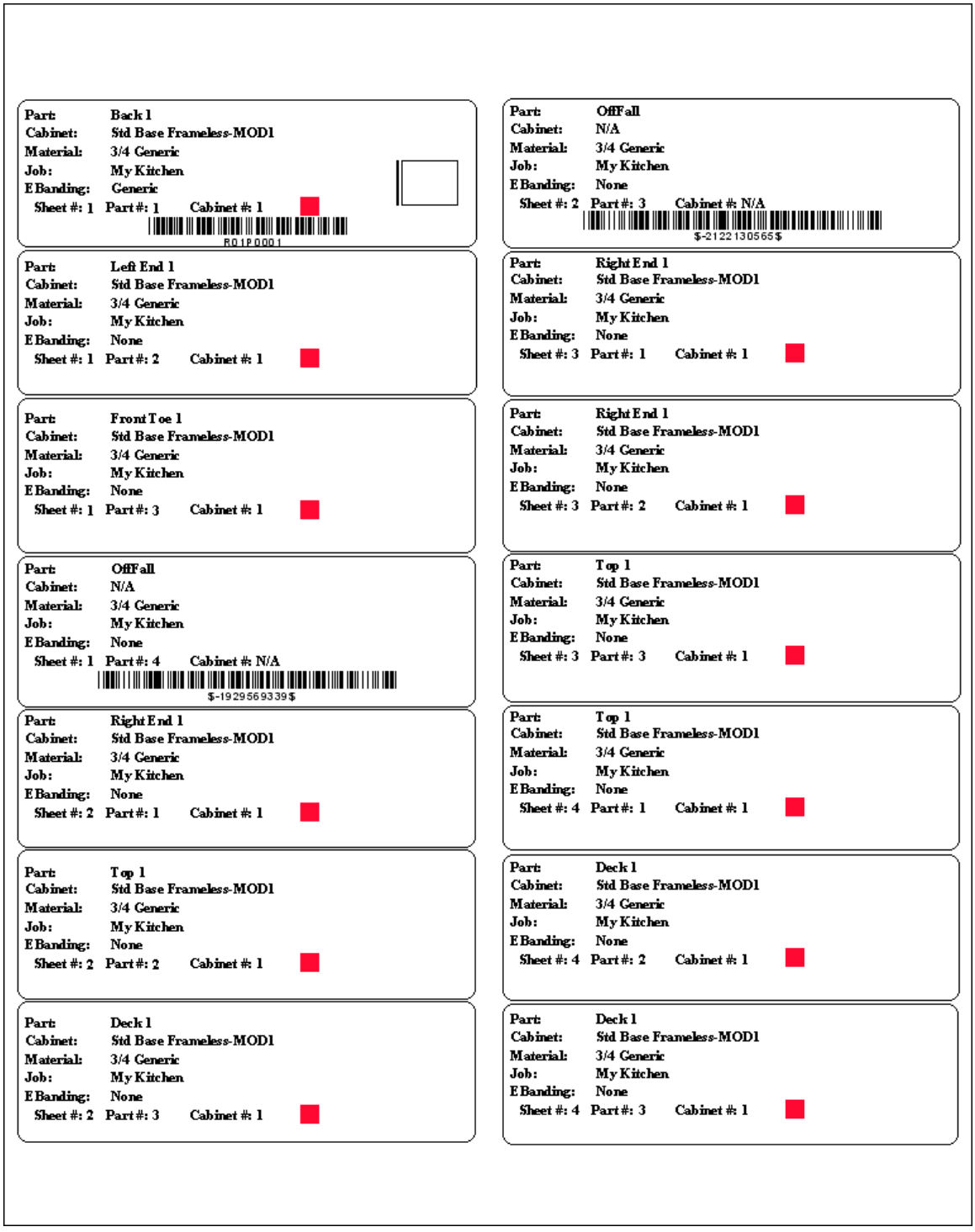
30256_Shipping_Symbol.rpt & 30256_Shipping_Symbol_Barcode.rpt

Label Type: Dymo label printer with 30256 Shipping labels



1p33x4_Address_Sheet.rpt & 1p33x4_Address_Sheet_Barcode.rpt

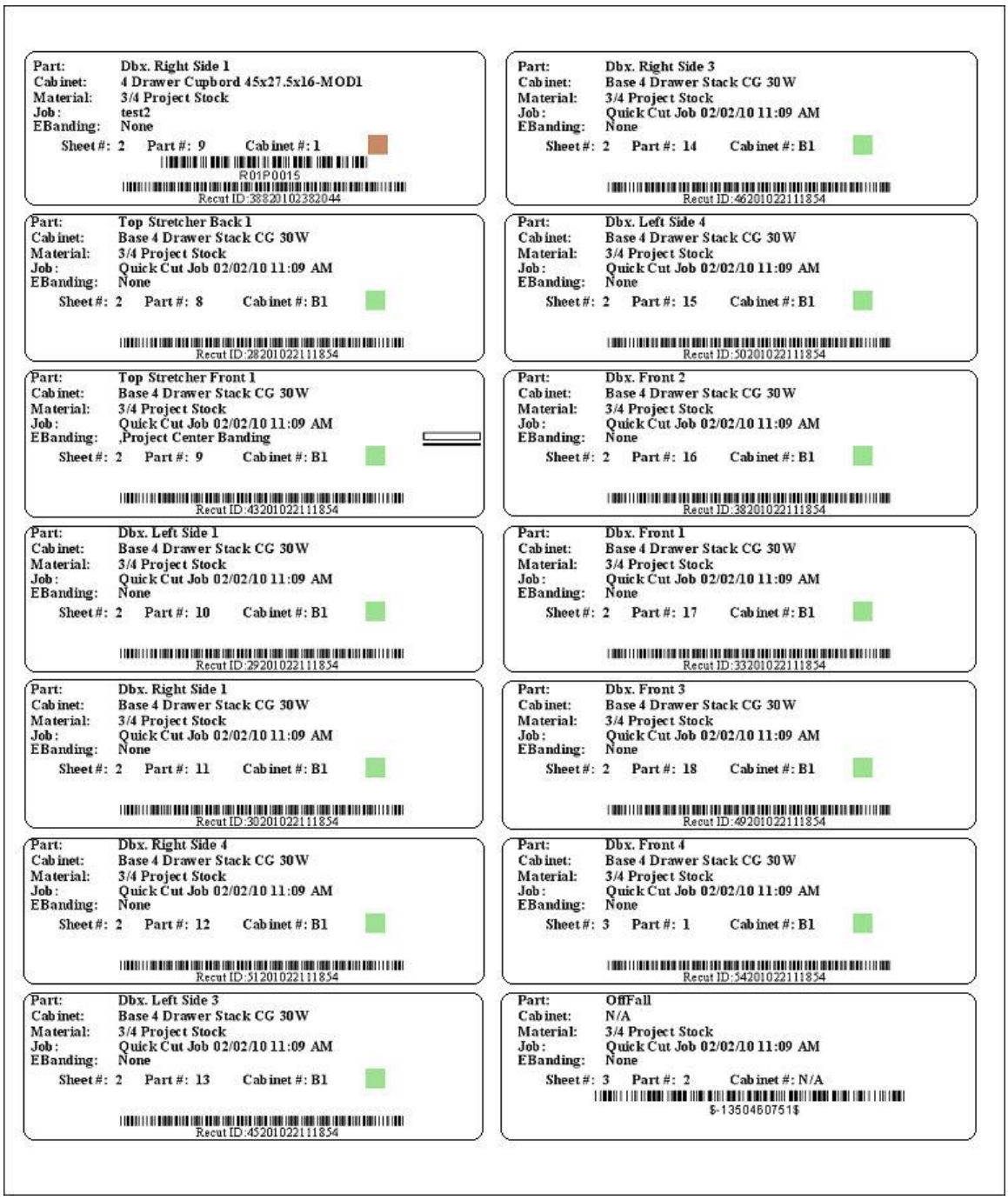
Label Type: Sheet Inkjet or Laser printer with 1.33" x 4" labels
- Avery 5162 or 8462
- OL100WR from www.OnlineLabels.com



1p33x4_Address_Sheet_Recut.rpt

Label Type: Sheet Inkjet or Laser printer with 1.33" x 4" labels
- Avery 5162 or 8462

- OL100WR from www.OnlineLabels.com


Part: Dbx. Right Side 1
Cabinet: 4 Drawer Cupbord 45x27.5x16-MOD1
Material: 3/4 Project Stock
Job: test2
EBanding: None
Sheet #: 2 Part #: 9 Cabinet #: 1
R01P0015
Recut ID:38820102382044
Part: Dbx. Right Side 3
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 14 Cabinet #: B1
Recut ID:46201022111854
Part: Top Stretcher Back 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 8 Cabinet #: B1
Recut ID:28201022111854
Part: Dbx. Left Side 4
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 15 Cabinet #: B1
Recut ID:50201022111854
Part: Top Stretcher Front 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: ,Project Center Banding
Sheet #: 2 Part #: 9 Cabinet #: B1
Recut ID:43201022111854
Part: Dbx. Front 2
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 16 Cabinet #: B1
Recut ID:38201022111854
Part: Dbx. Left Side 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 10 Cabinet #: B1
Recut ID:29201022111854
Part: Dbx. Front 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 17 Cabinet #: B1
Recut ID:33201022111854
Part: Dbx. Right Side 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 11 Cabinet #: B1
Recut ID:30201022111854
Part: Dbx. Front 3
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 18 Cabinet #: B1
Recut ID:49201022111854
Part: Dbx. Right Side 4
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 12 Cabinet #: B1
Recut ID:51201022111854
Part: Dbx. Front 4
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 3 Part #: 1 Cabinet #: B1
Recut ID:54201022111854
Part: Dbx. Left Side 3
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2 Part #: 13 Cabinet #: B1
Recut ID:45201022111854
Part: OffFall
Cabinet: N/A
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 3 Part #: 2 Cabinet #: N/A
-1350460751

2x4_Shipping_Sheet.rpt & 2x4_Shipping_Sheet_Barcode.rpt

Label Type: Sheet Inkjet or Laser printer with 2" x 4" labels
-Avery 5163 or 8463

-OL125WR from www.OnlineLabels.com

2x4_Shipping_Sheet_Recut.rpt

Label Type: Sheet Inkjet or Laser printer with 2" x 4" labels
-Avery 5163 or 8463
-OL125WR from www.OnlineLabels.com

Part: Back 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 1
Part #: 1
Cabinet #: B1
Recut ID:41201022111854
Part: Left End 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: Project Center Banding
Sheet #: 1
Part #: 2
Cabinet #: B1
Recut ID:39201022111854
Part: Right End 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: Project Center Banding
Sheet #: 1
Part #: 3
Cabinet #: B1
Recut ID:44201022111854
Part: Deck 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: Project Center Banding
Sheet #: 1
Part #: 4
Cabinet #: B1
Recut ID:42201022111854
Part: Dbx. Back 2
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 1
Part #: 5
Cabinet #: B1
Recut ID:37201022111854
Part: Dbx. Left Side 2
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 1
Part #: 6
Cabinet #: B1
Recut ID:34201022111854
Part: Dbx. Right Side 2
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 1
Part #: 7
Cabinet #: B1
Recut ID:35201022111854
Part: Dbx. Back 3
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 1
Part #: 8
Cabinet #: B1
Recut ID:48201022111854
Part: Dbx. Bottom 1
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2
Part #: 1
Cabinet #: B1
Recut ID:31201022111854
Part: Dbx. Bottom 4
Cabinet: Base 4 Drawer Stack CG 30W
Material: 3/4 Project Stock
Job: Quick Cut Job 02/02/10 11:09 AM
EBanding: None
Sheet #: 2
Part #: 2
Cabinet #: B1
Recut ID:52201022111854

Writing CNC

The “Write CNC” button is the final step for creating a nested program. When this button is selected from the main menu, Control Nesting will output the necessary code to cut parts, to the Thermwood Software screen. It will also save the file in the D:\Data\Rolling_Nest\CNC-Files directory.

DXF

DXF File Nesting Capabilities

With

Thermwood's Control Nesting

INTRODUCTION

All major CAD and cabinet design software programs offer DXF file format output of the completed design. The DXF format offers a standard format in which to transmit information, however, it does not specify exactly what information is transmitted. Therefore, each software package communicates information in a slightly different manner, even though they may all use the specified DXF format. To further complicate matters, most software allows the user to specify some critical information, the layer names for example. To offer universal compatibility between various software packages and the Thermwood 91000 Super Control, certain conventions have been established that the user must follow. These conventions fall into two categories. First, for files from certain software packages, we must know which software the files comes from in order to properly use the information included in the file. We have created a unique file extension for these instances. For example, DXF files from Cabinet Vision must use the file extension .cvDXF instead of the normal .DXF. You will need to rename the files using the proper extension before transmitting them to the Super Control. A complete listing of required file extensions is included in this tutorial. The second convention involves layer names. The DXF Translator relies on layer names to separate information for processing. The CAD system must have the ability to support layers to work with Control Nesting, however, most do since this is an integral part of the DXF format. Layers are used to separate information. Perimeter outline is placed on one layer, machine operation for the front side on another, etc. Some software hardcode the layer names so that the user cannot change them. In these instances, the file extension tells us which software created the file and we can then work with the fixed layer names. Most software, however, allows the user to specify layer names. In these cases, the user must use layer names that we recognize for us to be able to use the information properly. Once these two conventions are followed, the resulting files can be sent to the Super Control and selected along with other files and output from eCabinet Systems using the standard Control Nesting techniques. Files from multiple sources can be nested together in a single job, thus helping achieve better yields.

Defining Layer Names

Defining Layer Names

The following is a list of layer names that are recognized by Thermwood's Control Nesting Software. Layer names are not case sensitive.

Format

Example: **Name d#p# z#p#**

Name – This is the Portion of the Layer name that specifies the type of operation.

d#p# - Is inserted along with layer name, designates the diameter of tool to be used for particular operation (Used for centerline and pocket layers. MUST be at the end of the layer name).

z#p# - Is inserted along with layer name, designates z cut depth for all parts and indicates part thickness when on the outline layer of 2D parts. Must be at the end of a layer name.

The Letter "p" represents the decimal point for either the diameter or depth value. (Example: centerline d0p75 z1p5) This represents a centerline layer using a tool with a diameter of .75" and machining at a depth of 1.5".

Layer Names

outline - Indicates outline/through cut (Example: outline z#p#). Can be constructed with lines and arcs (Note: light weight polylines should work although polylines are not supported at this time. If saving DXF file from AutoCAD, select version 13, to save polylines as light weight type).

board - Is equivalent to an outline layer name.

panel - Is equivalent to an outline layer name.

border - Is equivalent to an outline layer name.

pocket - Indicates pocket cut (Example: pocket z#p# d#p#). If a tool diameter (d#p#) is not specified then the diameter set in Pocket Settings will be obeyed. All lines and arcs on this layer identify the outer boundary of a pocket.

pocket clamp - Indicates pocket clamp area for a pocket at the same depth. All lines and arcs on this layer identify the boundary of the clamp(s). Each desired clamp must be a closed chain. Nested clamps (clamps inside clamps) work in opposite behavior. The first clamp will prevent a tool from machining inside the clamp. A second clamp inside that clamp will cause the machining to occur inside the clamp. A third clamp inside the second clamp will cause machining on the outside of the third clamp and inside of the second clamp. If a user desires to have the clamp offset in or out based on tool diameter the key words **compin** or **compout** can be used in the layer name respectively. This is useful for clamping a hole and the user wants the machining to be performed past the edge of the clamp. For example: pocketclamp z0p375 (where the Z value matches the pocket depth of the pocket layer you wish to clamp)

dado - Indicates dado cut (Example: dado z#p#). This layer is constructed of (4) connecting, straight lines.

back - Indicates back operation for dado, chain, pocket, or drill (Example of back drill operation: backdrill z#p#). Z or depth values are defined from primary side, top of material.

drill - Indicates drill operation (drill z#p#). Geometry on drill layers must be constructed as complete circles. If the holes can be drilled with the drill bank Control Nesting will recognize.

bore - Is equal to drill layer.

hbore - Operation is ignored.

centerline - Cut indicating where the centerline of tooling will travel (Example: centerline z#p# d#p#). Layer must be constructed from lines and arcs.

chain - This layer has been added to give the user the ability to manually nest parts in the dxf file and control which direction the tool compensates based on the geometry. Also provides another tool to create toolpaths on interior geometry. Chain compin will compensate to the inside of the geometry and chain compout will compensate to the outside based on the tool diameter specified. (Example: chain compout z#p# d#p#).

start - Enables operator/programmer to specify a start point for chain type geometry that has been created within a DXF file (ie: entities saved on level/layer named: chaincompin/out or outline). To specify starting point for a particular design, you must take the one entity you wish to start on and save it to a level/layer of it's own. That level/layer name will then need to be same as chain type geometry that remaining entities

reside on, but must also contain the character set "start" at the end (ie: outline z#p# start).

Tool Name

A tool can be specified for an operation by using a name. The value should be in enclosed with brackets []. A tool with a matching name in Tooling will be used for the operation. (Example: centerline z#p# [toolname])

Stipulations

There can only be one “Outline” layer or layer that is equivalent to an outline layer, per DXF drawing.
The tool used to machine the “Outline” geometry is set up in the “Tooling” section of Control Nesting.
Geometry defining the “Outline” layer must be a completely closed or trimmed loop.
Circles must be broken when used on any layer other than the drill layer. (Circle geometry indicates drill operation to Control Nesting).
There can be no duplicate entities in DXF drawing.
If there is a diameter (d#p#) specified in a layer name (used to define diameter of tool to be used), the diameter must be identical to that of the tool in the tool manager on THM control.
Order of operations can be defined in a DXF file. This can be done by adding a number to the end of a layer’s designator name. The number will be use to identify the order of operations. Example: A part containing 3 different operations can be set up so that the operations are cut in a particular order:

“centerline1 z0p75 d0p5”
“centerline2 z0p82 d0p25”
“centerline3 z0p85 d0p125”

When using the Chain layer name, the number should be after the compin or compout designation. Example: “chain compin1 z0p75 d0p5”.

Tutorial

DXF Tutorial

The purpose of this tutorial is to provide the fundamentals for creating DXF files for use with Control Nesting software. The sample DXF file used in this tutorial may be downloaded from this link: http://order.ecabinetsystems.com/updates/layers.dxf.
There is also a picture of the DXF file available in this document to help understand the setup.

Layer Definitions

Outline

The perimeter of the part is drawn on the layer named “outline z0p75” and is drawn in the color green. This layer name tells *Control Nesting* that it is an outline operation with a cut depth of 0.75. Since this will always be a through cut, it should be equal to the material thickness. The material thickness used when loading each dxf file in the Control Nesting Software **MUST** match the thickness specified in the outline layer! The depth of cut is controlled by the “z0p75” section at the end of the layer name. The “p” represents a decimal place.

Dado

The next layer to discuss is the “dado z0p3125” layer. This layer defines the upper left dado operation for the part and is red in color. As you notice, this particular dado is being machined 0.3125” deep from the top of the part.

Drill

The “**drill z0p1875**” layer is being used to drill the blue 0.25” diameter holes towards the bottom left of the picture. These holes will be machined 0.1875” deep from the top of the part. You may also notice there is a “drill z0p75” layer. This layer contains the 2.5” diameter circle to be cut 0.75” deep from the top of the part (through cut). Although this is drawn on a drill layer, it will be machined out by the use of our circle interpolation

macros provided in your Thermwood Super Control. These macros will only be used if the hole diameter is larger than the tool diameter

Centerline

Now we are ready for the "centerline d0p375 z0p75" layer. Up until now the DXF file has been drawn exactly as the part is. For this layer, we need to draw where we want the center of the tool to follow….a centerline. This layer has many possibilities and is meant to define interior cuts, however odd they may be. In the picture above, the odd yellow shape represents the "centerline d0p375 z0p75" layer. Let's take a closer look at this particular layer name. We already know that the word "centerline" represents the toolpath for an interior cut. We also know that "z0p75" represents a 0.75" deep cut from the top of the material. The "d0p375", however, represents what size tool we want to use to machine the interior cut. Once again, the "p" represents a decimal place. The letter "d" represents diameter. In this case, a 0.375" diameter tool will be used to perform a 0.75" deep cut from the top of the part.

NOTE: The diameter of the tool must always be used in this layer. It must also follow the operation, but be before the depth of cut. In order for Control Nesting to select the correct diameter tool as specified in the layer name, the diameter that is listed must be identical to that of the tool diameter as it is listed in the Tool Manager (F10, F9, F2) of the Thermwood controller.

Pocket

Level number 9 contains the purple geometry in the bottom center of our example and has been created on a layer named "pocket d0p5 z0p375". This pocket will use a tool with a diameter of .5" and machine the pocket .375" deep. If the diameter of tool to be used isn't specified in the layer name the tool set in the Pocket settings in Control Nesting will automatically be used for the cut. The cut convention or style will be set in the settings dialog in Control Nesting. You have the ability to change from spiral, zig-zag, inside to out or outside to in, etc.

Chain

Levels 10 and 11 illustrate the use of the Chain Layer. These are "chaincompin d0p375 z0p125" which will use a .375" diameter tool to machine the cut .125" deep, and "chaincompout d0p25 z0p125" which will use a .25"diameter tool to machine .125" deep. Chaincompin will compensate to the inside of the geometry and chaincompout will compensate to the outside of the geometry. These layer names will give the operator the ability to create manual nests in the dxf file or serve as an additional tool for performing interior cuts.

NOTE: The diameter of tool must be specified when using either of the chain layer names.

Order of Operations

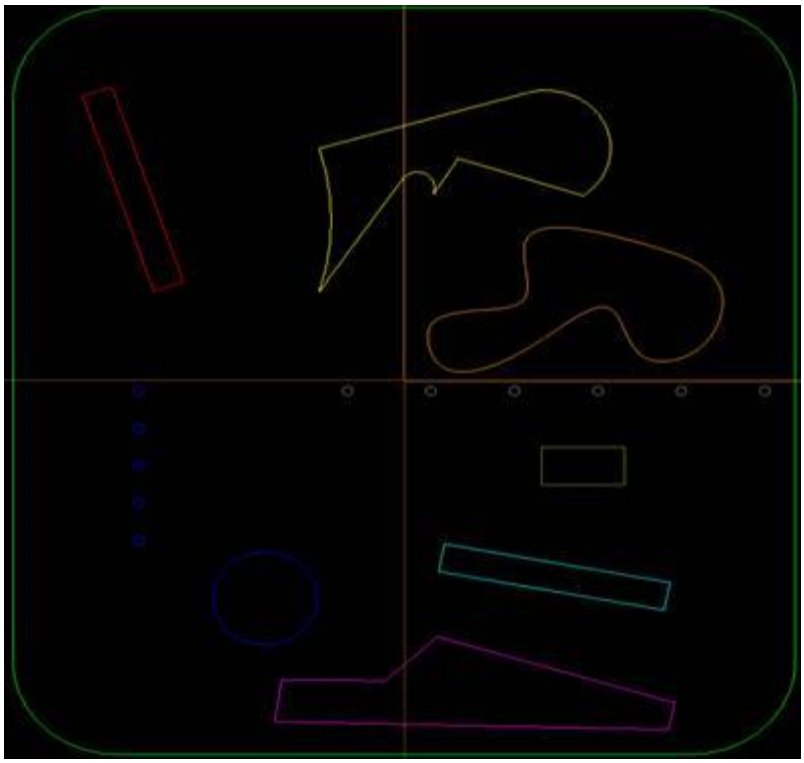
You also have the ability to specify the order of operations with the layer names by adding the number to the end of each layers designator name, and Control Nesting will use that number when setting the order of operations. Example: A part with 3 centerline operations could be done with 3 different layer names, thus setting the order that each of the three centerline operations will be performed with respect to the other centerline operations.

NOTE: You can specify the order of any of the available layer names by simply appending the number in which you want that operation to be cut. This will work with any of the available layers.

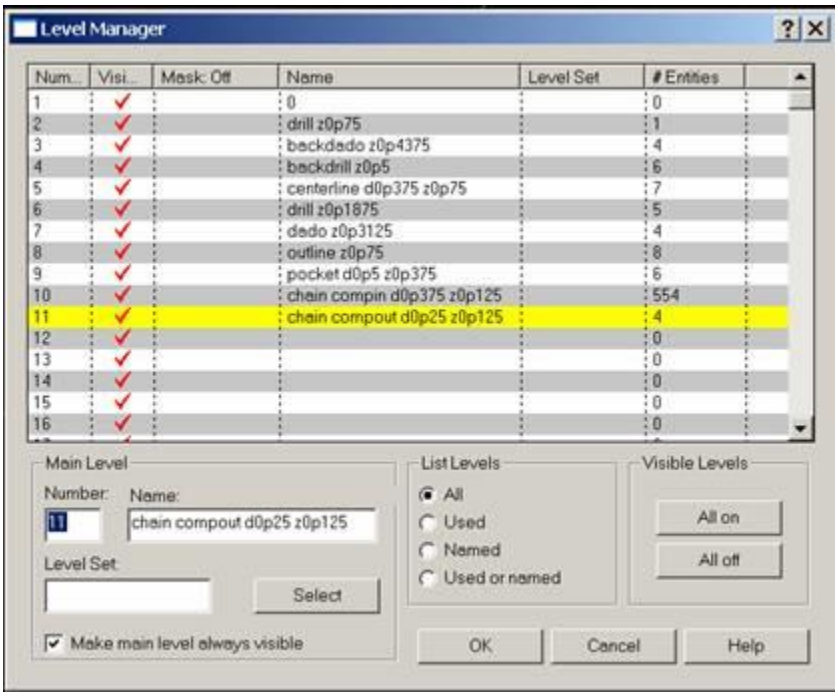
"centerline1 z0p75 d0p5"
"centerline2 z0p82 d0p25"
"centerline3 z0p85 d0p125"

Sample DXF File

Let's begin by opening the DXF file named "layers.dxf" in a CAD/CAM software that supports the DXF file format. Take a moment to view the different layer names and what is drawn on each of them. This is the key part in making DXF files work with *Control Nesting*. The layer names contain information such as type of operation, depth of cut, and in some cases, the diameter of tool to be used. Below is a picture of the DXF file:



Level Manager Example:
Level Manger image of the above DXF file to illustrate the layer names, depth and tool diameter settings for each corresponding layer:



Entities may be drawn in any color. The drawing can be in metric or inches. In the Control Nesting SETTINGS option on the Thermwood controller, the FORMAT section needs to be Metric or Imperial depending on the format of the DXF drawing, this will determine the output of the CNC code. The colors being used here are for tutorial purposes only.

Flip Operations

Flip operations can also be used in DXF files. To do this, you will need to add the word "**back**" to the layer name as we did in the "backdado z0p4375" and "backdrill z0p5" layers. There is one stipulation with both these operations. The depth of cut is still entered from the same side of the material (top) to where you want the bottom of the tool to be (Thickness of material – depth of cut = z? p?). For instance, the above .dxf file is drawn for .75" thick material and the backdado operation is set at 0.4375" from the top of the part. The result will be a 0.3125" deep dado on the underside of the part. The same goes for the backdrill operation….the result will be 0.25" deep drill holes. You may also use the "back" feature with centerline, chain, and pocket layers.

There are two ways back side operations are completed.

Flip Operations First:

When the option for Full Sheet Flips is used the back side operations are cut for the entire sheet first. The user is prompted to flip the sheet once it is trimmed to ensure squareness.

Post Front Side and Perimeter cutting:

With this technique the flip operations will be appended to the end of the CNC program. The operator will be prompted to remove the wasteboard (if used) and load the first part that requires flip side machining. The part must be flipped from left to right and located in the fence location. Typically the fence location used is the G902 location but may be customized to your needs.
Unique Requirements for Software Packages

Cabinet Vision

File extension must be *.cvdxf so that front and back operations will be merged. If the extension is only *.dxf it will be treated as a normal DXF.

KCDW

File extension must be *.kcdwdxf so that front and back operations will be merged. If the extension is only *.dxf it will be treated as a normal DXF.

Microvellum

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

Cabinet Solutions

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

Pattern Systems

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

CADKEY

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

Rhino

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

Turbo Cab

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

MasterCam

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

AutoCAD

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

Intellicad

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

VectorWorks

Normally there are no specific requirements for this software. Contact Thermwood for special applications.

Dovetail Drawer Boxes

eCabinet Systems Drawer Box Designer Setup

To properly create a drawer box for CNC machining, there are a few parameters that need to be set. Several of these setting revolve around the geometry of the female dovetail router tool that will be used.

Load a drawer box into the drawer box designer. Go to construction setting, then construction parameters of the part that will have the male dovetails. You will see the Dovetail Settings in the upper right corner of this dialog. These values (excluding inset fields) can also be changed globally on the global settings tab of the construction setting dialog.

Placement Inset Values: Distance from the edge of the part to the center of the first tail.

Max. Dist. Between: Maximum allowed distance between (center to center) before adding an additional tail.

Dovetail Depth: This value is dependant on the female dovetail tool ‘s geometry. *(see dimension A in illustration 1)* When using the Thermwood supplied dovetail tool *FSH1065* this value is .35”

Fit Clearance: This value will apply side clearance for the dovetails. This may be desired for gluing purposes. The amount entered is the sum of the total clearance (a .01” fit clearance will apply .005” of clearance on each side of the dovetail)

Thickness (% of Material): This value defines the thickness of the dovetails. When using the Thermwood supplied dovetail tool *FSH1065*, it will be necessary to machine down approximately .21” of material to hide the dovetail radius when parts are assembled. The Thickness % can be calculated by taking the material thickness being used minus .21” divided by material thickness being used.
Thickness % = ((Material Thickness - .21”) / Material Thickness)

Dovetail Width: This is the dovetail width from tip to tip. Typically this value should not exceed 2 times the dovetail bit diameter *(see dimension B in illustration 1)*

Corner Radius: This value is dependant on the female dovetail tool ‘s geometry. *(see dimension R in illustration 1)* When using the Thermwood supplied dovetail tool *FSH1065* this value is .125”

Corner Angle: This value is dependant on the female dovetail tool ‘s geometry. *(see angular dimension C in illustration 1)* When using the Thermwood supplied dovetail tool *FSH1065* this value ranges 7-10 Degrees.

Set up at the Machine

Table flatness is very important to the success of a quality dovetail joint. If the machining surface is not flat, it may result in the dovetail tool's top radiuses gouging in some areas and being too shallow in others. This may result in an unsatisfactory fit. With that said, surfacing of the spoil-board and possibly the waste board/handling sheet will most likely be required.

The tool for the female dovetail routes must be set up in the Thermwood SuperControl's tool set up screen. The Diameter and Daylight values are the only critical values that must be set.

Daylight: This value is as important as the machining surface flatness. If this number is not accurate, again it may result in the dovetail tool's top radiuses gouging or being too shallow. This may result in an unsatisfactory fit. It MUST be understood that this value can be altered for the dove tail tool to help with the fit of the joint. If the tool is not cutting deep enough the joint will show a gap. If the tool is cutting too deep the joint will be too tight. This value will need to be altered based on fluctuations in material thickness. Keep in mind that the value for depth that is set in eCabinet Systems MUST be an accurate value relative to the tool's geometry. (Please refer to eCabinet Systems Drawer Box Designer Setup)

Diameter: This value is taken from the tip of the tails *(see dimension B in illustration 1)* If this value is not defined correctly, unsatisfactory fit may result.
Note: Although it may be best to locate the underlying issue, this value can be used to tighten loose side to side fit by increasing the value enter.

Control Nesting Settings Dialog
In Control Nesting, there are 2 parameters in the settings dialog that pertain to dovetail machining. They are Dovetail Radius Crunch and Male Dovetail Feed.

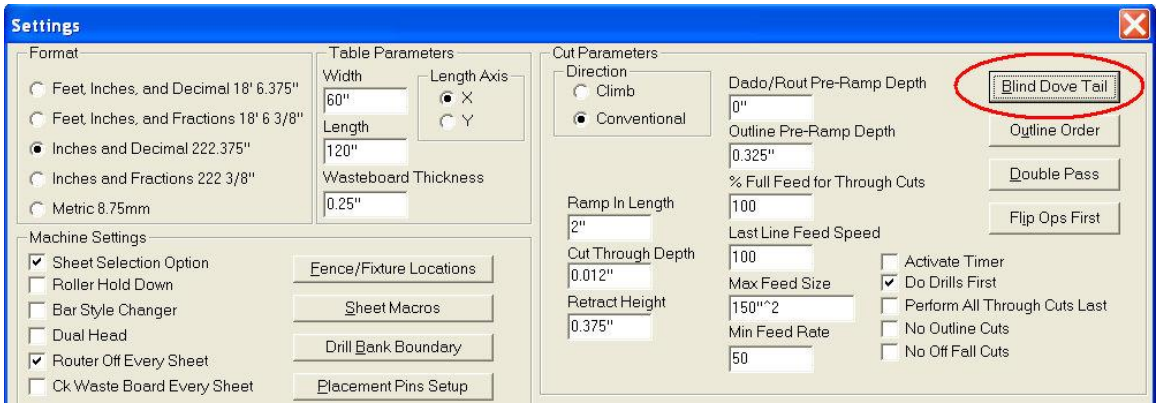
Dovetail Radius Crunch: Due to the nature of the blind dovetail joint, there are certain crushing factors that take place when assembling the parts. When machined to the perfect dimension, the sharp corners of the male tails will crush against the radius created by the female dovetail tool causing the tails to seat potentially too deep. This phenomenon is controlled by the *Dovetail Radius Crunch* value. The value entered in this field will pull the female tool geometry back causing a shallower fit. This amount should be adjusted until desired fit is achieved. Keep in mind that different materials may require different values. (A value of 0" will have no crunch applied. The larger the value, the shallower the female cut will be. *See illustration 2 for more detail*)

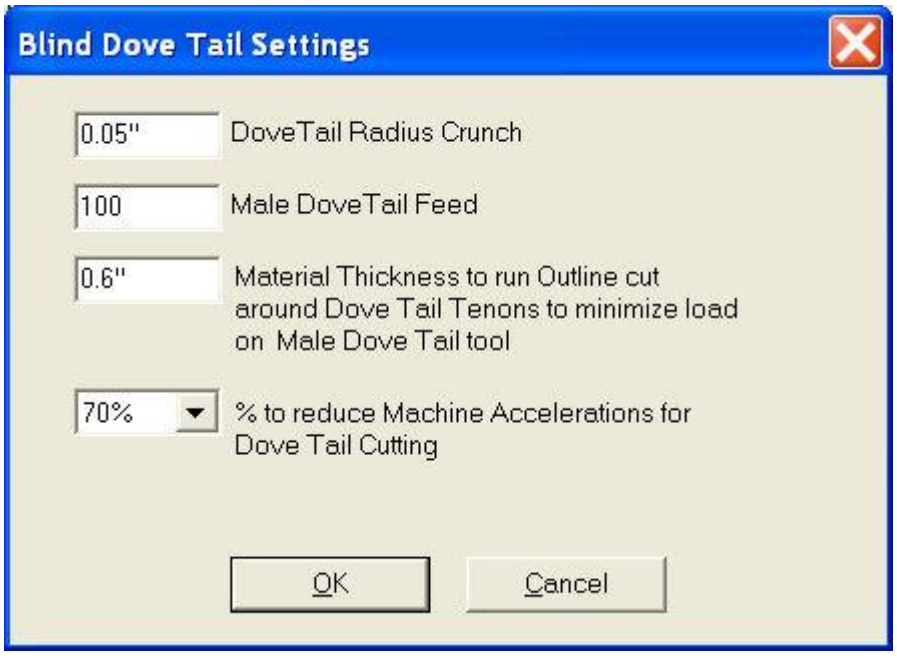
Male Dovetail Feedrate: This is the federate that will be used when machining around the male dovetail joints. It is not uncommon for the same tool cutting dado operations (which typically can be cut at much higher feedrate) to be used for cutting around the male dovetail cuts.

Material Thickness to run Outline cut around Dove Tail Tenons to minimize load on Male Dove Tail tool: This is a value that Control Nesting will refer to when

making the decision whether or not to use the outline tool to 'hog out' the tenons to give relief to the smaller tool which will do the final cutting. If the material is thicker than this value the outline pass will cut around the tenons if and only if the diameter of the outline tool can fit between the tenons. It will leave the skin thickness value. This option will cost time in machining, but will help with thicker materials since experience has proven that the smaller tools cannot handle the full load of thicker materials for this operation.

% to reduce machine Accelerations for Dove Tail Cutting: This setting can help to make the cutting smoother around the tenons and dovetail tool cuts.





During the testing phase of the dovetail drawer boxes, it was discovered that a conventional cut direction seemed to leave a much cleaner finished edge resulting in no or minimal clean up for assembly. With that said, a conventional cut direction would be

the recommended way. Keep in mind that not all materials will react in the same way, so a climb cut should be tried if conventional does not seem to give the edge quality desired. This setting is changed on the settings dialog under cut parameters, direction.

Control Nesting Tooling Dialog

When setting up tooling for the dovetail joints, there are a few tooling settings that need to be discussed. To get to the tooling dialog, select the Tooling button on the main Control Nesting dialog. First, it is required to designate an operation tool as being the female dovetail tool. This is accomplished by the following steps:

- Select the operation # desired
- Select a tool number for that operation
- Check on the *Dovetail Tool* option for that operation

Next, the operation tool for the male dovetail routs may be specifically designated by checking the *Use for Male Routs with Dovetail* option. Having this option checked will force it to use this tool if the diameter is acceptable for the rout. If the diameter is too large, it will search the operation tools for the largest acceptable diameter that will work. If this option is not checked for any operation tools, it will automatically do a search for the largest acceptable tool diameter available.

Note: If using tooling groups, ensure that the material being used exists in the group and that the operation tools needed are specifically set for that group.

Profiling & MDF Doors/Drawer Fronts

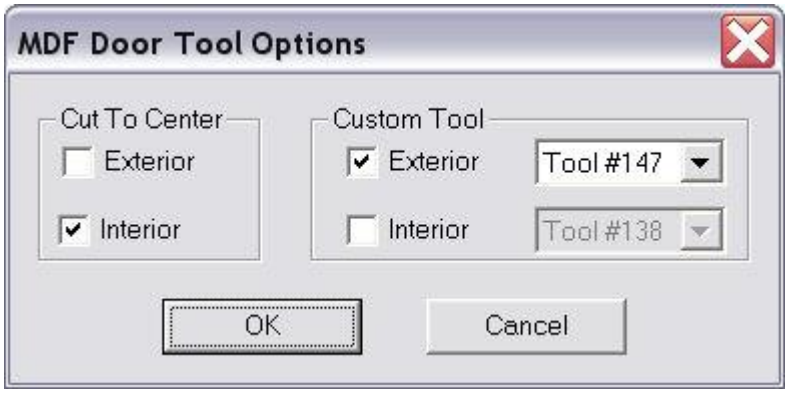
Version Requirements:

- Control Nesting 5.0 or higher
- THM (Windows 2000) 5.05 Build 9 or higher
- THM (Windows XP) 6.1.0.3 or higher
- Profile Modeller 2.0 or higher

Until Control Nesting version 5.0, all profiling done in eCabinet Systems with the Part Editor had to be machined using the Profile Modeller. This meant that all parts needed to be done on a one by one basis. Now with Control Nesting v5.0 and up, profiled parts can be nested and cut out using the same technology available with Profile Modeller. Since it uses Profile Modeller functionality you must have Profile Modeller installed on the Controller. If the Controller do not have Profile Modeller version 2.0 or higher installed Control Nesting will not support Profiling. If you start Control Nesting and see (With Profile Modeler) stated at the top of the dialog. You have the correct

versions installed. This must be present to function.

MDF Doors and Drawer Fronts are also eCabinet System's profiled parts so they work as well. Control Nesting offers some additional features for MDF Door/Drawer Fronts. In the Settings Dialog there is a button labeled "MDF Door Tool Options". This opens a dialog to set the modelling towards the center of the region and also allows the user to designate if they have a custom tool for the interior and/or exterior region. These settings are for all MDF Door/Drawer Fronts in the nest.



The modelling aspect of the profiles will use the default tool group designated in Profile Modeller.

NOTE: A future version of Control Nesting will allow more flexibility to modify region's tool designations uniquely.

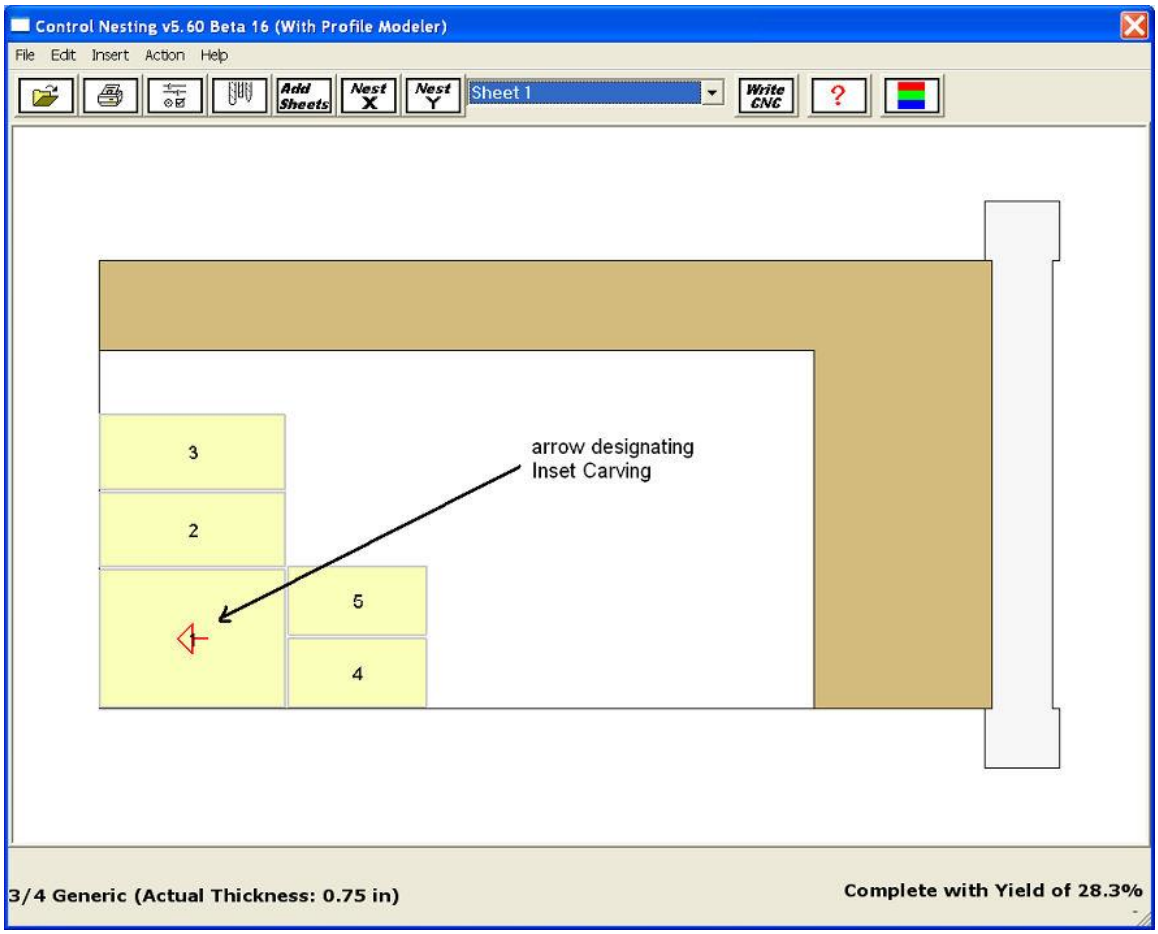
Inset Carvings

Version Requirements:

- Control Nesting 5.0 or higher
- THM (Windows 2000) 5.05 Build 9 or higher
- THM (Windows XP) 6.1.0.3 or higher
- Thermwood CNC Rental 2.0 or higher

Inset Carvings which are available through the Thermwood CNC Rental program can be applied to parts in eCabinet Systems. Control Nesting will perform these carvings as long as the Controller has the Thermwood CNC Rental application installed, the needed carving file is installed, and there are credits available to run the program.

The screen for Control Nesting will not display the carving. It will only display an arrow in the location the carving is to occur.



Glossary

O

Off-fall: Usable scrap leftover from an operation.

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